



The Important Role of System Dynamics Investigation on Business Model, Industry and Performance Management

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Abstract.

Purpose:

This research studies the development of the evolving dynamic system model and explores the important elements or factors and what detailed attributes are the main influences model in achieving the success of a business, industry and management. It also identifies the real and major differences between static and dynamic business management models and the detailed factors that influence them. Later, this research investigates the benefits/advantages and limitations/disadvantages of some research studies. The studies conducted in this research put more emphasis on the capabilities of system dynamics in modeling and the ability to measure, analyze and capture problems in business, industry, manufacturing etc.

Design/Methodology/Approach:

The research presented in this work is qualitative research based on a literature review. Publicly available research publications and reports have been used to create a research foundation, identify the research gaps, and develop new analyses from the comparative studies. As the literature review progressed, the scope of the literature search was further narrowed down to the development of system dynamics models. Often, references to certain selected literature have been examined to find other relevant literature. To do so, a supporting tool (that connects related articles) provided by Google Scholar, Scopus, and particular journals has been used.

Findings :

The dynamic business and management model is very different from the static business model in complexity, formality, flexibility, capturing, relationships, advantages, innovation model, new goals, updated information, perspective, and problem-solving abilities. The initial approach of a static system was applied in the canvas business model, but further developments can be continued with a dynamic system approach.

Originality/value:

The significant differences between static and dynamics can be used for business research and strategic performance management. This comparative study analyses some system dynamics models from many authors worldwide. Their goals are behind their strategic business models and encounters for their respective progress. This approach may serve as a checklist for new researchers in the field.

Keywords: Dynamic Business Model, Dynamic Performance Management, Enterprise Architecture Framework, Sustainability Dynamics Approach, Dynamic Start-up Business, Business Management Model for Sustainability

1. Introduction

Recently, the enterprise framework study has gained traction, forming a widely debated topic to investigate the boundary between regulation policy, governance, industry and business. Many investigations approach to progress and multiply (such as. Business Model Knowledge, Business Model Plan, Business Model

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3 Project, Business Model Invention, Circular Business Model, and so on). The existing records identified
4 that an increasing number of scientific researchers appeared in special editions of scientific publications,
5 scientific seminars, training, and scientific networks for academics (Foss & Saebi, 2017; Massa et al., 2016).
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7 Business process management has initiated the impact of optimisation and work efficiency for companies,
8 businesses and industries until now. Still, the digitalisation transformation has required businesses to be
9 flexible and affordable as well. In order to be a part of this digital era, submitting new levels of automation
10 flexibility through the digitalisation of business process management itself is required.
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12 Business performance management (B.P.M.) is a part of the transformation in social management. So,
13 business performance management cannot be separated from the consumer and social world. It is necessary
14 to assess whether the service capability provided is in accordance with the target in terms of the correct
15 number, best expense, and perfect moment. Measurement of results needs management to determine the
16 targets and direct performance variables used to assess the results (the number, quality, productivity, and
17 result of services covered). Then these variables, the aims of performance, are determined to obtain the
18 target. In the final stage, the business performance approach needs evaluation. All goals have been reached,
19 and the next activities are needed to fulfil the predetermined review variables/criteria (Bouckaert &
20 Halligan, 2008).
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23 The System Dynamics (SD) approach has a specific character compared to others. The SD methodology
24 may establish a substantial perspective of how accurate situations might influence the firmness of a system
25 in business performance and strategies (Sastry, 1997). SD arranges essential information and analyses for
26 strategic forecasts based on a flexible understanding of external and internal adjustment (Morecroft, 2007;
27 Bianchi and Bivona, 2002). The use of SD has provided a better understanding of the use of business models
28 so that they can estimate the benefits or carry out scenarios for developing elements of a business model
29 and see which scenario is the best. However, the development of the business model and the performance
30 that follows is still at an early stage and has not provided a comprehensive understanding of the categories
31 and potential development of business models and performance.
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34 This comparative study aims to briefly review System Dynamics Performance's structure and research
35 methodology from some business models and management. Sustainability-supporting business models are
36 studied in many forms, e.g., business models for sustainability (BMfS) and sustainability enterprise
37 frameworks. All of the forms discussed are the entire parts of the organisation's value proposition and value
38 creation logic.
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41 **2. Literature Review**

42 *2.1. Goal or Aim of Business Modelling*

43 The enterprise framework serves as a final task to be applied in new business venture strategy, framing how
44 a company will manage and how it will perform to achieve its objectives such as profitability, sales volume,
45 improvement, new technology, new invention, social impact, and value creation (Cosenz & Noto, 2018a,
46 2018b).
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49 The business modellings have been created with such elements as (1) characteristics of real companies, real
50 company factors that guide empirically and conceptually for classifying worldwide phenomenon of
51 corporations as a task of the dimensioned similarity/distinction on related strategic attributes, e.g., activities,
52 resources, capabilities, stakeholder network, and affiliated performance which form the value
53 created/captured by the corporation; (2) cognitive or linguistic schemas shape the implicit cognitive
54 anatomies showing from recently thinking models or mental patterns owned by executives in corporations.
55 Cognitive anatomies contain theories and connections within the system that lead executive perception
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3 about the pattern of jobs and trading to demonstrate the crucial interrelationship and value creation
4 connections at the businesses' trading linkage, and (3) formal and conceptual descriptions or representations
5 of how a business performs. The business model description recognises attributes that they presume to be
6 crucial in figuring out how a company performs.
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8 *2.2. The Ability and Benefit of System Dynamics*

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10 If some theories and business practise in the world of operation strategies validate, then SD structure
11 supports and specific advice to framework and analyse social organisations that are dynamic, complicated,
12 and unpredictable, in addition to the observation of framework to figure and strategy simulation for
13 governance for adjustment (Davis et al., 2007; Morecroft, 2007; Cosenz and Noto, 2016; Torres et al., 2017;
14 Forrester, 1961; Sterman, 2000).
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16 Dynamic Business Models (DBM) provide an essential understanding of strategy formation and venture
17 capital by figuring out how crucial enterprise framework or business model attributes interconnect to
18 construct and maintain competitive advantages from time to time. This condition happens by providing
19 methodological assistance to start-ups by applying their company ideas to proper conceptual representations
20 of how they should operate.
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23 Although not like other modelling simulation methods, the Methodology of System Dynamics (SD) could
24 deliver an essential insight into how accurate the conditions, such as strategies, could influence the
25 steadiness of a system for a start-up company and its achievement (Sastry, 1997). SD could deliver suitable
26 analysis and information for strategy arrangement based on a flexible perspective on both external and
27 internal adjustment (Morecroft, 2007; Bianchi and Bivona, 2000).
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29 System dynamics (S.D.) modelling can enhance performance measures in district authorities to support a
30 commonly held perspective of the appropriate organisational structure and behaviour among stakeholders
31 in local strategic planning. The SD model benefit locates achievement measurement in the wider
32 perspective of the organisation. The acknowledging impact of the SD Model can simplify the policy and
33 process, influencing particular outcomes, and the output may not be "simple" in the system (Bianchi,
34 Winch, & Tomaselli, 2008). The SD method admits to accomplishing a structure-and-behaviour analysis
35 according to the reinforcing loops underpinning the improvement that could be supported and recognised
36 by appropriate improvement policies. Furthermore, strengthening loops could be connected to relating
37 balancing loops that support an originated boundary to develop the organisation under investigation.
38 Policymakers can promote long-term growth by recognising and reversing the balancing loops (Bianchi &
39 Tomaselli, 2015).
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42 SD delivers data that could assist with the operation of dynamic complications, calculation of intangibles,
43 recognising postponements, acknowledging the connection in the long and short-term, and arranging
44 appropriate organisation limits in strategic planning. After getting into that matter, to assist policymakers
45 with proper perspective to understand the problem, to cope with feedback structure generating achievement,
46 and also to recognise possible strategies to revise the structure for developed achievement, they applied SD
47 modelling to assist an acknowledgement of (1) how achievement movers can influence end-results; (2) how
48 achievement movers can, finally, be impacted by the application of policymaker end to influence the
49 accumulated strategic resources and depletion mechanisms; and (3) how the stream of strategic assets are
50 influenced by final outcomes (Bianchi et al., 2018).
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53 The proposed methodology supports tiny company leaders to predict scenarios and produce good outcomes.
54 The decision support system generated subjective and objective factors, creating a direct, uncomplicated
55 model of understanding acquired by the specialist board. Furthermore, the integrated use of SD contributed
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3 to detailed analyses of some alternative scenarios. Inherently, the proposed model's unique nature requires
4 consideration as it does not allow for a decision without an important adjustment (Marques, 2020).
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6 *2.3. Dynamic Business Model*

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8 A Dynamic Business Model (DBM) provides a deep insight into the strategic application of business
9 venturing by illustrating how crucial business model variables synergy is to generate everlasting
10 competitive advantages. A DBM is demonstrated as a strategy device to properly outline theoretical
11 representations of how a system runs and generates a new value. This model assists start-ups in putting their
12 business ideas into action by providing a methodical approach to how businesses should operate. The
13 Business Model Canvas (BMC) consists of nine pillars connected to the main element of business dynamics
14 underpinning value creation processes: (1) Key-partners, that embrace the core stakeholders included in the
15 value creation processes, particularly, the person who admit an enterprise to operating; (2) Key-activities,
16 which illustrate the main jobs and processes to create value added; (3) Key-resources, i.e., the tangible and
17 intangible assets connected with the important success variables to be bought and growth in business
18 routines and, later, mobilised in value creation processes; (4) Value proposition, i.e., the relate between
19 consumer wants and the value produced by the company to gratify them; (5) Consumer relationships, that
20 describe how the organisation connects with its consumers and the formulas to restrain the consumers; (6)
21 Channels, which describe how goods/service allocation is managed; (7) Consumer segments, i.e. the
22 structure of the consumer level; (8) Cost structure, the structure of charges connected with an enterprise
23 preference with a particular goal on resources gain; and (9) Revenue flows, an illustration on goods/service
24 value and expected sales volumes (Cosenz, 2017).
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28 SD modelling irradiates the critical causal connections between the BM factors recognised in the
29 construction blocks, providing us with a holistic understanding of enterprise strategy and execution. The
30 causal connections form closed feedback loops (reinforcing or balancing) that define enterprise system
31 behaviour over time. (Cosenz & Noto, 2018). Enterprise sustainability relies on a proactive and anticipatory
32 attitude to sequences of emerging and voluntary transformation. It should provide the dynamic consistency
33 label to the enterprise's ability to continue and construct its achievement while revising its enterprise
34 framework (Cosenz & Noto, 2015; Bivona & Cruz, 2021).
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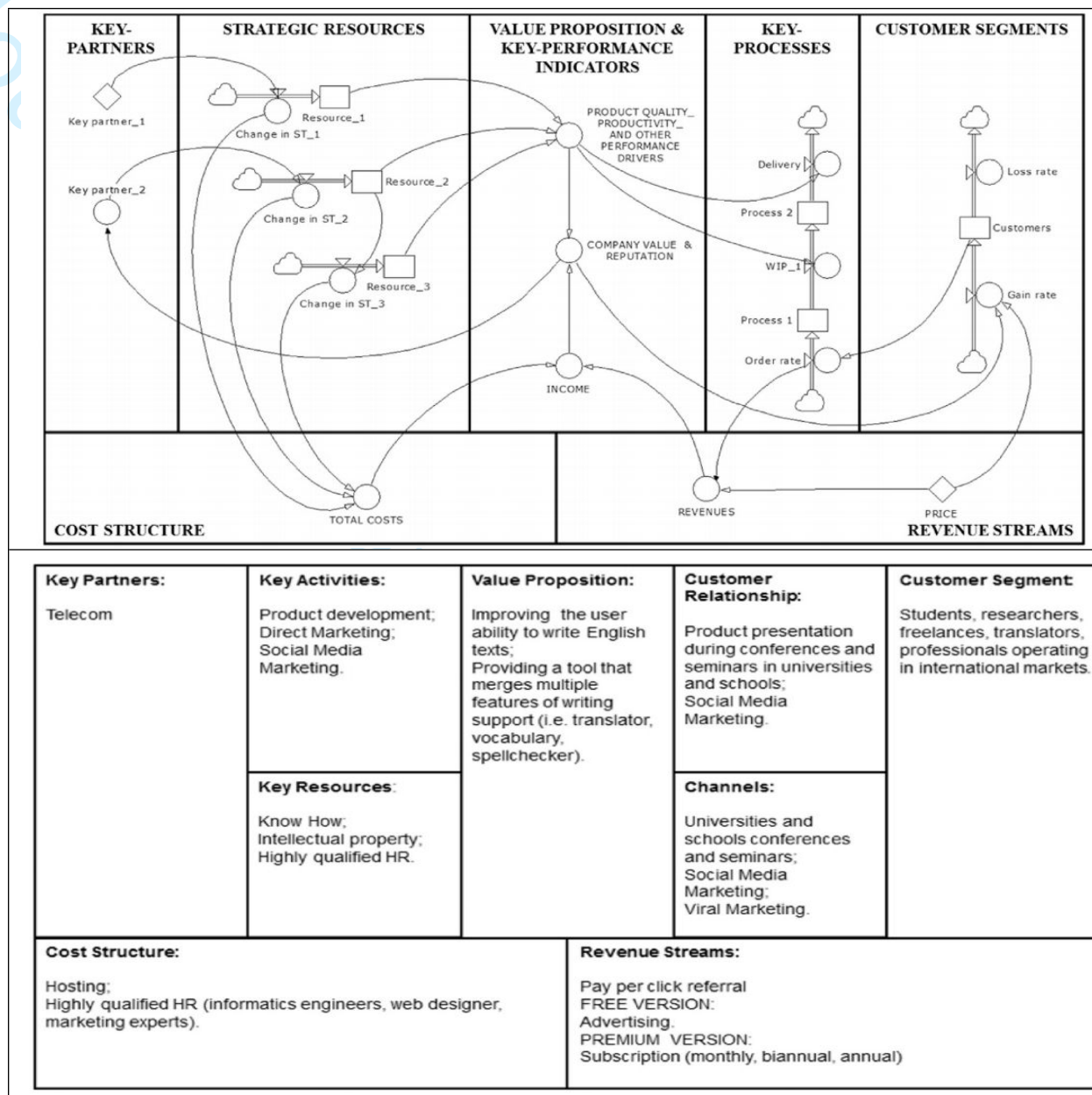


Figure 1: The Dynamic Business Model framework structure adopted from Ludwig's B.M. Canvas (Cosenz & Noto, 2017)

To cope with the above BMC limitation, SD modelling establishes valuable methodological assistance to enterprise modelling (Hajiheydari & Zarei, 2013; Bianchi et al., 2015; Groesser & Jovi, 2015). The SD methodology was generated in the early 1960s and late 1950s at M.I.T. by Jay Forrester. This theory is used for simulating and modelling complicated social systems and physical experimentation with the frameworks to construct strategies for adjustment and operation (Forrester, 1961). It is also used to describe fundamental SD frameworks according to a feedback perspective of enterprise systems, shown as a closed border, i.e., realising all the critical factors connected to the problem being explored. SD modelling, in particular, is applied to the system of map level to deliver and measure an insight into the quantification of the connection to create a group of equations and behaviour-driving processes that shape the fundamentals for simulating feasible system behaviours over time. SD frameworks are effective kits to assist with

perspective and support the feedback interrelationship of complicated operating systems. The methodology of the proposed model for operational can assist both decision-making and enterprise planning (Bianchi et al., 1998). In the application world, businesspeople could utilise all of these models to examine various schemes and investigate what may have been made – or made – under the alternative of dissimilar future and old opinions and across various result options (Gozali, 2018; Sterman, 2000).

The dynamic business model has been a complicating factor because Ludwig's founders at the beginning applied a linear, biased, and static definition of the dynamics of Ludwig's company. Then, they also identified it as challenging to fully acknowledge the protocol underpinning the design of the DBM according to feedback loops (Torres et al., 2017). Groesser and Schwaninger (2012) remarked that easy-to-use graphic illustrations could create a wrong result by establishing the false image that framework is an easy and speedy process. Meanwhile, some users usually find out challenging to structure uncomplicated insight frameworks to reflect highly Convolved systems of the enterprise (Cosenz, 2017).

2.4. *Dynamic Performance Management*

The advantage of dynamic performance management (DPM) is that it assists policymakers in describing and applying for local strategic programs. Dynamic Performance Management is expected to cope with some weaknesses of conventional performance management techniques (Bianchi et al., 2017; Bivona & Cosenz, 2021). This theory, based on the dynamics modelling system used for Performance Management, can help to address such flaws (Bianchi & Tomaselli, 2015). Insight of SD modelling is a settled application that can be useful to advise on the acknowledging of processes and mostly relies on visual representation (Wolstenholme, 1999).

The complexity of SD is because of a variety of elements. The critical things are numerous policymakers who put a different value on policy results (Gozali, 2020), demanding policy trade-offs in space and time; numerous service tracks influencing the results; decision structures that are consecutively related, introducing rigidity into the system; a time gap between the system's results and the stakeholder decisions; significant nonlinear cause-effect connections; and the uncontrollability and unpredictability of external variables (as provided by policymakers) that can influence the results of the system (Bianchi et al., 2016).

The SD model establishes qualitative study and rational structures for the next level of model designing. A Dynamic Performance Management (DPM) illustration and the impact graphic are translated into a quantitative system dynamics stock and flow simulation model, by applying correct district information to help strategic study, coordination, and performance management in the "multi-actor" situation. Even more, this model identifies feedback loops with critical policy application. SD irradiates how this dynamic influence of interferences in "secondary" agencies can be a key in decreasing the NEETs' number (under 25s "Not Educated, Employed, or Trained), demonstrating the need for connecting policymakers and leaders encountering SYP (services for young people). A DPM approach may also assist policymakers in answering the policy obstacles that Convolved systems dynamics often represent. The qualitative system dynamics modelling approach is built to apply and develop a full DPM system. Where little certain information and sources can be gathered, qualitative modelling assists in modelling a complicated dynamic system, expanding a more sophisticated simulation framework, and increasing preliminary policy figures for policy achievement and result measurement (Bianchi et al., 2013; Bianchi, 2016).

Table 1. A Connection Chart Between BMC and DPM (Federico Cosenz , (2017)

		BUSINESS MODEL CANVAS ELEMENTS								
		KEY-PARTNER	KEY-RESOURCES	VALUE PROPOSITION	KEY-ACTIVITIES	CHANNEL	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS	COST STRUCTURE	REVENUE STREAMS
DYNAMIC PERFORMANCE MANAGEMENT ELEMENTS	STRATEGIC	√	√						√	
	PERFORMANCE			√						
	END RESULT			√			√		√	√
	ACTIVITIES AND				√	√			√	
	PRODUCTS						√			√
	CLIENTS						√	√		√
	OBJECTIVES			√			√			

2.5. The importance of the Enterprise Architecture Framework

In the previous study, there were three departments in the enterprise architecture framework: (1) enterprise architecture (EA); (2) linkage architecture; and (3) technology architecture. The most recent study has reached zones that use the semantics of business vocabulary and rules (SBVR) (Kang et al., 2010) from a significant proof to achieve and connect the department of EA based on strategic business planning. IT and HR combine EA with the business's circumstances to play an important role in EA dynamics. Actually, building an EA requires the use of business modelling tools, having an enterprise ontology, and possessing an architectural blueprint.

Many argue that the business model can help start-ups produce better decisions and solve problems within a limited time (Stirna & Zdravkovic, 2015). A particular example that should be deliberated when an

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3 enterprise model (EM) is implemented is how to interpret EM and how the created models can significantly
4 impact business. Another consideration is that the enterprise model needs to be oriented on modelling the
5 future and assisting in enterprise and company alteration. Until now, not many businesses are attempting
6 to generate valuable goods that their firms should possess and obtain (Stirna & Zdravkovic, 2015). The
7 meta-model approach has two ultimate factors: 1) modelling method, which has to recognise a) modelling
8 procedure and b) modelling language; and 2) modelling mechanisms, which illustrate the underpinning
9 factors of how the model will be done mathematically and logically. This theory has been implemented to
10 promote an applicable model for business engineering (Hinkelmann, 2015).
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13 The conceptual framework can help in identifying and designing the concepts, assisting us in
14 acknowledging how to focus on variables that influence enterprises (Robinson, 2011; Mylopoulos, 1992).
15 The past path may help forecast the future result via a learning stage. Still, it could not accurately
16 acknowledge past data or forecast future demand. The ultimate objective of this hard work is to achieve the
17 highest possible wisdom level in the decision-making process. Researchers illustrate their
18 acknowledgement of the term by applying a specific language driven by their perspective of the fact, which
19 is truly what the theoretical framework is most likely. People generate the semantics for a theory to capture
20 a more logical and formal perspective of the fact, which could promote the cognitive opinion. This
21 theoretical framework can be described as robust and formal in the last three decades by applying
22 syntactically and semantically mature framework notations (Duan & Cruz, 2011; Gregory, 1993).
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24 2.6. *Business Model for Sustainability*

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26 The environmental business model for sustainability entrepreneurial thought must assist the production of
27 valuable solutions in overcoming circumstances and social obstacles (Senge, Lichtenstein, Kaeufer,
28 Bradbury, & Carroll, 2007). A growing number of start-ups and business leaders are promising to positively
29 impact the economy and society while not negatively impacting the environment (Starik & Kanashiro,
30 2013). The BMfS companies "contribute to solving societal and environmental solutions through the
31 embodiment of a successful enterprise" (Schaltegger & Wagner, 2011). Hence, the economic value of
32 production is both a means for creating value for the community and ecological circumstances and also a
33 goal in itself (Hockerts & Wüstenhagen, 2010).
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36 Until now, the sustainable value of production has mostly been reached through innovation in process,
37 product, and technology (Hansen, Grosse-Dunker, & Reichwald, 2009). The proposed study has many ways
38 to acknowledge, build, and analyse these enterprise frameworks. Many studies learn about how successful
39 companies can change their current enterprise model to a BMfS (Sommer, 2012), or how the researchers
40 could generate enterprise for sustainability cases (Lüdeke-Freund, 2013). In particular, the researchers do
41 not describe how the natural environment, value creation, and profit creation (captured value) can
42 reciprocally equip and strengthen one another.
43

44 Enterprise frameworks could be translated into complicated and dynamic systems (e.g., Demil & Lecocq,
45 2010). The partial modelling approach should decrease complexity and obtain multilevel systems, which
46 involves dividing a big model into some micro models. (Abdelkafi & Täuscher, 2016). Consolidating
47 sustainable development into the further enterprise framework increases complexity (Porter & Derry,
48 2012). The result has three enterprise framework elements: 1. customer value proposition, 2. value creation,
49 and 3. value capture.
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51 The expanded framework fulfils the four conditions needed in the "Conceptual Development" part. Firstly,
52 the SD model helps policymakers acknowledge how the enterprise model could influence natural
53 circumstances. Two kinds of impact are recognised as a direct influence through the environmental value
54 creation and value proposition ability and an indirect influence via the consumer's behaviour. In achieving
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3 a rapid elimination of the negative influence on the circumstances, generating an environmental value
4 proposition and changing the value creation ability is much better than altering the consumer's behaviour.
5 Secondly, the framework discloses the direct and mostly indirect influence of the original circumstances of
6 the company. The environment influences the enterprise framework directly due to its influence on the
7 company's value creation ability and indirectly through the trust of the consumers and policymakers. Third,
8 the SD model demonstrates the different kinds of stocks and flow diagrams that connect the ultimate
9 stakeholders of a BMfS. The critical inventories are the company's value proposition and environmental
10 value proposition, which is the value proposition delivered to stakeholders interested in the circumstances,
11 the value creation ability, value capture, and ecological capital. Fourth, the framework stands for critical
12 feedback loops describing the logic of a BMfS from a stakeholder view. For example, feedback loops could
13 create self-reinforcing ecological trust in the policymaker or the consumer, directing an enterprise model
14 change to support more sustainability. Other than that, two important connections have been identified that
15 could affect postponements in the entire system: from the circumstances to the policymaker and from the
16 policymaker to the enterprise framework (Abdelkafi & Täuscher, 2016).
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20 The appropriate enterprise framework elements can guide and strengthen feedback loops (Sánchez &
21 Ricart, 2010; Casadesus-Masanell & Ricart, 2007). Current enterprise framework references identify the
22 fundamental strengthening feedback loops between value generation and profit creation (e.g., Abdelkafi &
23 Täuscher, 2016). The value-based perspective usually embraces value capacities and their constituent
24 variables. Generally, a minimum of three main value elements are involved: (1) customer value proposition;
25 (2) value creation, value architecture, or business infrastructure; and (3) value capture or profit generation.
26 4. value communication, 5. value delivery is consolidated into the overall value creation ability of the
27 enterprise. 6. organisation value. (Abdelkafi, 2012). Lüdeke-Freund (2013) delivered four components in
28 the theme of enterprise framework for sustainable innovation: value proposition, supply chain, consumer
29 interface, and economic framework. Lüdeke-Freund (2010, p. 21) illustrates a BMfS as an enterprise
30 framework that generates a benefit in competition through ultimate consumer value and provides a
31 sustainable improvement of the community and enterprise.
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33
34 Concerning sensitive matter from a framework is to change the value of its parameters, change its structure,
35 and develop trust by examining the unpredictability that is frequently connected with parameters. The SD
36 framework must be validated via a sequence of examinations oriented on construction, culture, and strategic
37 application (Forrester and Senge, 1979; Groesser & Schwaninger, 2012;). In the past few eras, the SD
38 framework has been integrated with tactical achievement administration systems established to be
39 successful in nourishing the process of strategic learning and, as an outcome, assist in decision-making and
40 achievement development based on a systemic standpoint (Bianchi, 2012; Bianchi *et al.*, 2015; Cosenz,
41 2014; Cosenz & Noto, 2016). This theory is recognised as Dynamic Performance Management (DPM) and
42 aims to help the decision-making mechanism via good governance between performance measurement
43 records and strategy modelling. Actually, the application of SD to performance management aids enterprise
44 analysts in identifying both drivers and sources that guide a given achievement structure over time and, as
45 a result, delivers in increasing the mechanism of diagnosis that allows enterprise leaders to deliver effective
46 movement and policies focused on penetrating the lack between the reality and the high achievement
47 standard. This theory is based on three interconnected perspectives: (1) an instrumental perspective, (2) an
48 objective perspective, and (3) a subjective perspective (Bianchi, 2016).
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51 The main benefit of the DBMfS canvas depends on its dynamic origin, as opposed to the essentially static
52 development driven by the existing business model kits in the BMfS reference (Dentchev *et al.*, 2018). The
53 model reveals a fundamental explanation of the relationship among the components of a BM and how main
54 enterprise values accrue from the interaction among key resources, processes, and stakeholders.
55 Furthermore, this suggestion model provides a consolidated perspective of the main value proposition
56 approach, according to the connection between value drivers, production, and result. The logic of all these
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management kits for drawing BMfS depends on the concept that the main invention must be moved toward producing social and/or environmental advantages in enterprise management, therefore changing the orientation of the value proposition to the community and the circumstances (Cosenz, 2019).

2.7. Static and Dynamic Business Model

The strategic operation sector flourishes in many strategy kits (e.g., Business Model Canvas, SWOT analysis, Balanced Scorecards, Boston Consulting Group matrix) compiled as the division of a broader strategic action compared to the strategy itself (Spee & Jarzabkowski, 2009). They consist of "techniques, tools, methods, models, frameworks, approaches, and methodologies available to assist decision-making in tactical operations. Table 2 shows the differences between a Static Business Model and a Dynamic Business Model in several factors.

Table 2. Overview of the differences between a Static Business Model and a Dynamic business model of several factors

No.	Factor	Static Business Model	Dynamic Business Model
1	Complexity	The static business model provides a non-detailed picture (Massa et al., 2016)	The methodology of System Dynamic is a method for capturing the dynamic factors of complicated society and organisational systems (Forrester, 1961; Sterman, 2000). The dynamic business model provides a complex picture (Burton & Obel, 1995; Sterman, 2000; Rachmawati, 2022; Zhou et al, 2022; Varga-Csajkás et al, 2022; Song et. al.,2022; Liu et. al., 2022; Jing et. al.,2022; Colivicchi and Iannucci, 2022; Reike et. al., 2022).
2	Formality	Implicit, unformal (Massa et al., 2016)	Formalised in the diagram, design, mathematical, or symbolic modelling (Massa et al., 2016), and associated framework measurement (Bianchi, 2002; Richmond, 1997; Varga-Csajkás et al, 2022; Mismetti, et. al, 2022)
3	Flexibility	The perspective of conventional BM representations (Cosenz and Noto, 2018a)	Rapid and flexible approach (Demil & Lecocq 2010). Study unpredictability and uncertainty of enterprise fields. Predicting and proactively sort voluntary and arising adjustments (Demil & Lecocq, 2010; Chesbrough, 2010; Saraf and Shastri, 2022)
4	Capturing	To build typologies as a strategy for the coherence between critical enterprise framework factors (Demil & Lecocq, 2010)	System dynamic frameworks are produced for a particular managerial problem and constructed by figuring the enterprise system construction to create and convey an acknowledging of

No.	Factor	Static Business Model	Dynamic Business Model
			behaviour driving processes, also the measurement of the cause and effect interactions to generate a series of equations that placed the preliminaries for simulating feasible system behaviours over time (Warren, 2008; Varga-Csajkás et al, 2022; Koul et al, 2022; Riaz et. al.,2022; Khan and Hassan, 2022; Lane and Rouwette, 2022).
5	Relationship	Describing static relationship (Demil & Lecocq (2010)	Strategic Changes, arising opportunities value creation in the market. Structure the relation between critical interdependencies and value creation. (Demil & Lecocq, 2010; Chesbrough, 2010; Abdelkafi & Tauscher, 2016; Baden-Fuller & Haefliger, 2013; Loock & Hacklin, 2015; Perkmann & Spicer, 2010; Magretta, 2002; Rachmawati, 2022; Zhou et. Al, 2022;).
6	Advantages	Attractive insights (Demil & Lecocq, 2010; Chesbrough, 2010)	Achieving new goals or gaining sustainable competitive advantages. (Demil & Lecocq, 2010; Andries et al., 2013). Give new advantages to the entrepreneur via business model innovation based on updated information (McGrath, 2010; Cosenz & Bivona, 2021; Varga-Csajkás et al, 2022; Saraf and Shastri, 2022).
7	Perspective	Specific sectors of the main enterprise framework factors (Demil & Lecocq, 2010; Chesbrough, 2010)	Fulfil different functions (Demil & Lecocq, 2010)
8	Problem Solving	An effective way to analyse the consistency of a given firm (Demil & Lecocq, 2010).	To integrate change and ensure performance over time (Demil & Lecocq, 2010; Liu 2022; Varga-Csajkás et al, 2022).

Although all frameworks are imperfect illustrations of the fact (Greenberger et al., 1976), engaging stakeholders can develop model precision and validity and foster the harmonising of the key players' behaviour models and group agreement about what actions should be taken (Vennix, 1996).

The business needs to be modelled from the start to get a picture of what variables make up the system of the business to be developed. The description of these business variables or factors can be obtained from the static business model. In addition to business descriptions, business models have capabilities and benefits such as modelling simulation, strategy formation, etc. that affect business achievement and performance measurement. The formation or setting of a business strategy will also have a significant

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3 influence on the architectural picture of the model that has important adjustments. These adjustments give
4 an overview of the dynamics of the business model as a result of performance measurement. All business
5 models cannot be separated from their role in social obstacles and ecological circumstances, which are
6 intended for environmental solutions.
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8 **3. Methodology**

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10 The methodology in this study consists of seven case studies, one qualitative study, and two studies on
11 some type of business. Some of the above studies are applied in an interview with the experts. Based on
12 Table 3, many Sistem Dynamics models are applied to some types of business, such as start-ups (Cosenz,
13 2017; Cosenz & Noto, 2018a; Cosenz & Noto, 2018b; Bianchi, & Cosenz, 2018), family businesses
14 (Marques et al., 2020), government (Bianchi, C., & Tomaselli, 2015), sustainability businesses (Abdelkafi
15 & Täuscher, 2016; Cosenz, et al., 2020), and trading companies (Marques et al., 2020). The stakeholders
16 in business performance management (Cosenz & Noto, 2018a) are the company, environment, decision-
17 maker, consumer, investor, and supplier (Bianchi et al., 2015).
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20 This method evaluates some case studies in the system dynamics method application. Among ten case
21 studies that have been explored, experimental and reference techniques can be drawn. The criteria were
22 determined as the reference technique. In the case of another reference technique with different stories, the
23 different criteria should be analyzed. However, this study has no statistical power or validation. The method
24 of this comparison study should therefore anticipate application in business practice. This was an important
25 reason to point to the use of predefined criteria defined within a desired future business context. This study
26 presents a methodology for comparison in some case studies. This comparison study caters to similar
27 business processes across several case studies in system dynamics method applications; hence, process
28 variants may manifest due to the differences in the nature of businesses, heterogeneity in the types of cases,
29 etc.
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32 An in-depth comparison is conducted once the case study compares to the other case studies. To illustrate
33 this, the application of some SD comparison techniques. The technique detects significant differences
34 among ten SD case studies and overall performance. The results of this technique identify those parts of the
35 Benefits/Advantage and Limitations/Weaknesses of SD case study applications. Using this technique, we
36 contained and obtained valuable insights.
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38 **4. Comparison Study**

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40 Business Model Design is a branch of study and practise devoted to developing a master plan of a business
41 (business and I.T.) variables, indicators, ideas, and assisting kits and methodologies to enrich enterprises
42 with a holistic view of the management construct and culture. Usually, the stages of business design are
43 strategic, practical, organisational, communication, and technical stages. Table 3 shows the Comparison
44 Study of System Dynamics Performance Business Models and Management.
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Table 3. Comparison Study of System Dynamics Performance Business Models and Management

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
1	2016	Abdelkafi & Täuscher	Enterprise framework for Sustainability	A case study from Bettervest GmbH, a start-up from Germany, which was built in the year 2012	The framework links four sections: the company, the society, the policymaker, and the consumer. It describes the work of Business Models for Sustainability and how these firm frameworks can be started.	Four requirements were composed in the "Conceptual Development" context. Firstly, SD helps policymakers in acknowledging how the enterprise framework operates. Second, direct and indirect impacts through the customer's behaviour and the natural environment on the firm. Third, the critical factors are the company's value proposition and circumstances value proposition, which support the stakeholder's apprehension about the circumstances. Fourth, the framework illustrates critical feedback loops describing the logic of the stakeholder's view of BMfS.	The VBN concept does not encompass any social impacts or network links among people. It has proven that some consumers' decisions and executive or business activities are driven by social conditions, which are not within the final version. This research ignored the system characteristics that cause firms to illustrate and apply BMfS successfully.
2	2015	Asif et al	S.D. framework for Product multiple lifecycles	The literature review is based on a qualitative study	The modelling's main goal is to help decision-makers in the Product's Multiple Lifecycles (P.M.L.). The framework clearly	SD simulation delivers the decreasing dependency on the material that can gain strategically and make a company less inclined in material scarcity and	Decision-makers have to not make their regulations via the simplest estimating physical availability of substances. Additionally, they need to

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
					reveals a connection among material reserve, supply, business achievement, and the requirement to adopt the Product Multiple Lifecycle theory.	charge volatility. In the same analysis, Sutherland et al. (2008) assumed that the reproduction of car machines can save energy by up to 90%. Hauser and Lund (2012) stated that reproduction could save energy and material in general, by up to 80%. Goldey et al. (2010) assumed that the reproduction of IT appliances decreases material and energy expenditure, reducing the greenhouse gas emissions effect.	consider other externalities that can save the material-producing nations from exporting materials to the global market. P.M.L. may be a model to reduce dependency on material assets. However, the most effective worldwide efforts can enhance the situation considerably
3	2015	Carmin Bianchi [6]	A dynamic performance approaches	The research of the municipality of Caltagirone, a little city in Catania county, Italia	The analysis reveals that Dynamic Performance Management knowledge can help local strategic planning by permitting policymakers to plan the short-term of a long-term plan. The other side assists the connection of strategic aims to appropriate goals achievement at gauging expected and arising targets.	The benefit of utilising this model is that it puts the achievement calibration within the wider perspective of the system (Bianchi, Winch, & Tomaselli, 2008). System dynamics (SD) modelling can enhance PM in local government to flourish a shared perspective of the relevant system's construction and behaviour among stakeholders in local blueprint arrangement.	There is a gap of reference discussing the particular complication of the field. First, the blueprint work is not ultimately focused on a single organisation but rather on a geographic area. Second, this needs management between different organisations and a result perspective to explore how adopted strategies will affect the area's achievement. Third, a trade-off analysis (in both time and place) is

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
						<p>The SD method allows a construction-and-culture analysis based on which the strengthening circles underpinning development can be recognised and nourished by an appropriate improvement scheme. Also, strengthening circles can be coordinated with interaction balancing circles, which establish a source of limit to developing the explored system. By immediately discovering and against balancing circles, policymakers can nourish sustainable improvement.</p>	<p>required: a strategy might help local achievement in the short term, but it may also guide to unintended results in the long term. Fourth, the complexity mentioned above suggests the need for a feedback perspective. And a poor recognition of policy results.</p> <p>This work has no qualitative modelling to enhance the DPM method for the local blueprint program.</p>
4	2016	Carmine Bianchi, [7]	Young people service transformation in Applied Dynamic Performance approach	A case study for the Young People's council in Surrey County Council	This research has discovered a journal and practical model for creating a model to help decision-makers resolve.	A DPM diagram and an impact chart are translated into a quantitative system dynamics stock and flow simulation model using accurate local information to assist strategic studying, connection, and achievement governance. Such a framework establishes qualitative study and rationable construction for the next modelling process. The qualitative system	This work is less detailed and has no quantitative analysis.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
						<p>dynamics modelling approach and application of the whole DPM system. Qualitative modelling helps conceptualise a system's dynamic complication, augmenting previous policy models and improving more advanced simulation frameworks for calibration and strategic development.</p>	
5	2017	Federico Cosenz [8]	Supporting start-up business model design through system dynamics modelling	This research interviewed six young potential Italian businessmen for four hours for each meeting). They include a young potential Italian businessman, an I.T. student, and his software developer partner.	<p>The framework that connects technology invention and business performance consider the competitive dynamics, the effect of technology on firm framework creativity, and the operation of technology invention. This perspective discovers how the Dynamic Business Model may support potential businessmen with a lean performance approach and performance equipment to be applied even during the company's lifespan.</p>	<p>To overcome the above BMC shortages, the SD framework contributes a valuable methodological approach to the enterprise framework (Cosenz, 2015; Groesser & Jovi, 2015; Hajiheydari & Zarei, 2013). Following the SD approach, frameworks are based on a feedback perspective of enterprise systems, shown as a closed limit related to the investigated phenomenon.</p> <p>SD frameworks are important kits to assist knowledge and leverage the feedback connection of complicated administration systems. The frameworks</p>	<p>Considering the rivalry and other external power that impact a company's sustainability (e.g., previously restricted data) is foundational to the designing unpredictability and dynamic complexity that describe today's market segments (Demil & Lecocq, 2010). In this regard, the BMC is a static model and needs additional methodological assistance to better design such a dynamic complication. Additionally, the following important factors are still unsettled: what are the impacts of</p>

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No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
						<p>also offer a work methodology to assist both enterprise planning and decision-making (Bianchi et al., 1998).</p>	<p>growth in key resources on key activities, the consumer base, charges, and incomes? Is there a linear or nonlinear connection between these factors? Is there any trade-off in organising a competitive advantage between the short and long-run? And how to successfully organise them? These problems restrict a comprehensive knowledge of how the enterprise is run and, as an outcome, do not nourish the strategic learning process of key players or third parties involved in the enterprise's improvement.</p> <p>Eventually, the B.M.C. fails in establishing a connection between the enterprise blueprint scheme and achievement arrangement and measurement. Brinckmann et al. (2010) underline that the form of a B.P. can be intended to impact a company's achievement, while</p>

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
							Delmar & Shane (2003) irradiate a positive connection between enterprise planning and new company achievement. The illustration and application of a B.M. must be intended not only to inform and acknowledge how the company is intended to run and generate value to the prospective venture capitals, but also as a kit to be utilised regularly, adaptable to contextual adjustment, with the two-fold goal to develop entrepreneurial skill and arrange achievement (Berends et al., 2016).
6	2017	Federico Cosenz[9]	A dynamic business modelling approach to design and experiment with new business venture strategies	A case study of Ludwig, a start-up company, built in 2014 and domiciled in Palermo, Italy	The Enterprise Framework's key performance indicator is experimental skill and knowledge. Traditional approaches to designing a firm framework are still far from inclusive of the probability of fast experimenting with alternative strategies and investigating the related script in terms of	The dynamic Business Model result has been a complicated factor because Ludwig's founders at the beginning applied a linear, biased and static definition of the dynamics of Ludwig's business. Then they also identified it challenging to fully acknowledge the protocol underpinning the design of the DBM	The accuracy of the analysis made in constructing its DBM and measuring the systemic interrelationship among the framework factors. The prevailing references to simulation-based techniques propose that all frameworks are an imperfect description of the actual condition.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
					the ability to make a profit, arise, new creation, society effect, etc.	according to feedback loops (Torres et al., 2017). Groesser and Schwaninger (2012) remarked that user-friendly graphic illustration could create a wrong result by establishing the false image that the framework is an easy-to-use and speedy process. While some users usually find out challenging in structuring uncomplicated insight frameworks to reflect highly Convolved systems of the enterprise.	Since they are constructed on the assumption, their validity depends on the extent to which these assumptions are matched (Richardson, 2013; Sterman, 2000; Morecroft, 2007). The identified assumptions on which a framework can be adapted in order to assess the sensitivity and consistency of an observed outcome to particular assumptions. Key findings from unassociated data systems can be consolidated into one framework as inputs or else for framework measurement.
7	2018	Federico Cosenz[10]	New Enterprise investor strategies by SD	A case study of Ludwig, a start-up company that was built in the year 2014 and domiciled in Palermo, Italy	Illustrate the operating enterprise and innovation for its stakeholders, e.g., firm venture and competition council have institutionalised Business Models' use to review a firm idea's validity and the generated profit to finance it.	1. Innovation through a fine-tuning process-oriented to support new market opportunities and/or strategy re-formulation, 2. In uncertain and unpredictable environments, arising strategies may inspire an immediate initiation of activity to foster from emerging opportunities in the market	The requirement to apply more applied skills and science to the DBM model and its success in delivering business initiatives and enterprise strategy framework that support problems for both students and practitioners.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
						3. BM should embrace a fast and adaptable theory to rearrange BM to take benefit of these opportunities and effectiveness in achieving new aims.	
8	2018	a.. Carmine Bianchi[11]	Lean Dynamic Performance approach by SD	A case study from Artisan, a new firm of the start-up, established company, and micro-giant firm	<p>This journal's conceptual model shows authentic empirical research to learn about lean, dynamic performance management systems that might support start-ups with a bunch of key performance motives that aid them in accentuating the right move in every of the four review criteria.</p> <p>A lean PM system in small and micro firms can combine the advantage of a structured with a flexible and selective approach. The 'lean' attribute is used here to characterise a different approach in applying PM to small and micro</p>	<p>System Dynamics modelling has been applied to help acknowledge: (1) how final outcomes can be influenced by achievement drivers; (2) how achievement drivers can, in turn, be influenced by the implementation of policy levers intended to affect strategic resource accumulation and depletion processes; and (3) how final-outcomes impact the flows of tactical assets.</p>	<p>The obstacles in devising and carrying through an appropriate review of the arising enterprise frameworks and recognising other options. This condition could be happened because of a shortage of well-developed skills in enterprise framework or simply the inherent problems in modelling this for a highly new invention and novel construction.</p> <p>Their value is restricted in terms of helping policymakers illustrate a critical character design over time and framing and evaluating the causal construction influencing them.</p>

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
					firms compared to larger organisations.		
	2022	b. Peide Liu et. Al.	System Dynamics for supplier selection	Survey Subject-matter experts	The System Dynamics model for supplier selection was developed by considering profitability, productivity, social transparency, and customer satisfaction in three stages. First stages based on Theoretical Framework and Literature Review. Second stages Subjective model and third stages dynamic model of supplier selection.	System dynamics can asses indicator affecting supplier selection and provide a dynamic model for supplier selection. Finally System Dynamics help to achieve more competitive power and customer satisfaction.	For the good result, the data, information and the indicator, variable, factors should be updated.
	2022	Yuxuan Zhou	system dynamics in engineer-to-order supply chains industry	project-based production	SD develop and analyse an ETO Model by applying system dynamics and control engineering approaches. First, required to set the boundary and its positioning in the dynamics of production planning and control systems. Second, Define, analyse distinguished variables and features for an ETO	SD can develop an ETO Model which can automatically control the production to maintain the lead time, at the same time we conclude that holistic system level order book controller is much effective than a local controller in production planning and control.	Many assumptions about Capacity limitation and constraint. And the result of this research is only for the ETO Industry model.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
					archetype. Third, need to set the satisfies targeted system state requirements.		
9	2019	Federico Cosenz[12]	Support for sustainable enterprise models	A case study from Patagonia, a firm domiciled in Ventura, California, United States, and running a business in outdoor apparel and gear manufacturing.	The Dynamic Business Management for Sustainability theory may support decision-makers in creating sustainability-related goals built upon the core of worth invented by certain motives. So it can create the improvement of sector-specific or type-specific strategies for sustainability. Many manufacturing areas (e.g., electronics, clothes, and consumer goods) or sort of firms (e.g., start-ups, small and medium-firm, and large firms) respond differently to sustainability motives' achievement.	The main benefit of the DBMfS canvas depends on its dynamic origin, as against the naturally static level taken by the existent BM kits in the BMfS references (Dentchev et al., 2018). The proposed model also offers a consolidated perspective of the main concept of value proposition, basically constructed on the connection between value drivers, production, and results. The logic of all these management kits for modelling BMfS depends on the concept that the important innovation must be mobilised towards creating social and/or environmental advantages in enterprise management, therefore shifting the centre of the value proposition to the community and the circumstances.	First, the approach of the DBMfS theory still does not permit the quantitative model's management. Second, although the model example nurtures a developed understanding of the model, the empirical approach should describe the framework's validity. Third, the particular kinds of information that are required to be illustrated in the framework, each one of the BM elements, are still not determined and require further refinement. Specifically, the feasibility to measure and simulate a DBMfS is quite difficult due to the major complication of capturing reliable information on the long-term results (i.e., sustainable value) created by a system.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
10	2020	Marques	A dynamic family enterprise accretion	Seven experts from many business backgrounds (i.e., automotive, accounting, team building, and industrial and electronic equipment trading).	A black line shows the beginning framework. The outcomes show that four sectors have the best increasing centrality worth, namely: (1) Psychosocial criteria; (2) Firm Policies and Management; (3) Connections or linkage; and (4) Family sectors. The effect of the improvement is a factor in the framework as a whole"	The decision support system generated involved both subjective and objective factors, which generated a clear, simple reflection of the understanding acquired from the panel of experts gathered for this research. The proposed methodology permits small-enterprise executives to predict alternatives and make better conclusions. Naturally, the proposed model's idiosyncratic origin requirements must be taken into consideration as it does not permit for Extrapolations without the needed adaptations.	The methodologies applied were subjective and context-dependent, so ultimate warning is required when extrapolating the outcomes achieved. Despite these constraints, this research's findings offer a critical approach and practical contributions that can further the improvement of the affiliated reference. On a theoretical level, the proposed FCM-SD model is process-oriented and constructivist, indicating that the proposed system can be applied as a learning process.
11	2022	Vecchio	System Dynamics for E-Health Management	ICU Patients in hospitals in the adoption of Electronic Health Records (EHR)	SD contributes to the debate related to the adoption of new approaches and techniques in the field of e-health by providing useful simulations for the effective decision-making of health care managers and decision makers.	The adoption of an SD approach as a quantitative forecasting method able to evaluate the effects of digital health care on humans with the standards of organizational efficiency represented the main contribution offered by the study to the advancement of research	With the adoption of IT systems containing a large amount of information and personal data on patients, new opportunities have emerged, as well as new challenges. The awareness issues of privacy in computer data are significantly evolving

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
					Even more important is probably the emerging evidence of its applicability in strategic planning and, therefore, prior to the start of investments and executive projects, especially in situations involving a lack of information, such as in less developed contexts, in which insufficient data can be obtained from previous application cases.	and practice and highlighted the benefits of its adoption for the optimization of e-health services.	the organization's laws and regulations must adhere. The limitations alongside its advantages regarding new assessment scenarios: are its scalability, the ability to extend the model both regarding hospital structures and wards and toward other healthcare delivery methods, and the possibility of integrating additional variables to simulate the adoption of further technologies or effects resulting from their implementation that have not yet been considered.
	2022	Peijiang Liu	Diseases SARS-CoV-2 management	Theoretical Study	Conclusion and solutions are obtained for various arbitrary parameter counts. Specific vaccine procedures and treatments for infectious diseases are very important as the process of receiving vaccinations are seen as effective tools for eradicating	The system dynamics can explore more the deep problem of Sars-Cov-2 about increasing population density of affected disease, the trend of the human behaviour with the infected disease, dynamic of infected population, what is the influencing factors with the declining number of the infected human population, how many	The data and information should be accurate and sufficient enough to execute Sars-Cov-2 Research. the results of the model using the generalized derivatives are much more precise and more accurately describe real-world phenomena.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
					SARSCoV-2 in the human community.	people have received vaccination and what is the effect after getting vaccinated.	
12	2022	Hassan Riaz et. al.	Construction	Respondent (preliminary questionnaire survey and a detailed questionnaire survey).	Pave the way for creating a strategy or policy or quality-oriented environment, which is more feasible for Total Quality Management implementation and enhances the quality performance of construction projects in developing countries.	<p>The SFD was developed to connect causal relationships and polarity and subsequently used to develop the SDM. Top management commitment, continuous improvement, and quality of education regarding TQM and the TQM (converging stock) were specified as four notable stocks of this SDM. The combination of influence matrix, CLD, and SFD assisted in developing the SDM simulated through VENSIM</p> <hr/> <p>software over five years. Over time, the existing three accumulated stocks under the influence of reinforcing interrelationships illustrated exponentially increasing behaviour of the TQM as the converging stock</p>	System Dynamics Model is not applied to real projects/case studies in both developed and developing countries which can compare the results and advance the body of knowledge.

5. Discussion

Prediction of the strategy formulation and insight from the perspective of internal factors (outcome, value creation, culture, communication, profitability, operation, growth, technological innovation) and external factors (Social impact, Value creation, Competitive Advantages). Understand external factors, such as unpredictability, uncertainty, and uncontrollability. In detail, dissect critical elements supporting a company's success (procedures, resources, capabilities, network, outcomes, stakeholders) and the best methodology that supports business success. Forming an understanding of the mechanisms of dynamic consistency, dynamic complexity and interdependence of models that influence the mental, perspective, mindset, and way of communicating management in the organisation. Understand the conceptual modelling technique, modelling language, modelling procedure, and modelling mechanism that form cognitive arguments from patterns, data structures, and past information to obtain a future model representing the accuracy, maturity, and realistic nature of the model obtained. Solutions and creations are obtained by the learning process, strategic development, cause and effect analysis, performance measurement, performance improvement, decision-making process, and corrective action.

This article investigates system dynamics in performance business models and management in the last five years. This comparative study analyses some system dynamics models from many authors worldwide. Their goals are behind their strategic business models and encounters for their respective progress. This study presents policy recommendations on how the next study should be assessed for creating further system dynamics in performance business models and management studies. This approach may serve as a checklist for new researchers in the field.

The measurement of business performance management relates to profitability, growth, innovation, social impact, experimental skill [Cosenz & Noto, 2018], networking, psychosocial factors (Marques et al., 2020), quality, quantity, efficiency, outcome, and technology development (Cosenz, 2017). The sector of the industry in Table 1 includes the gear industry (Cosenz et al., (2020), automotive industry (Marques et al., 2020), electronics, apparel, consumer goods, gear industry (Cosenz et al., 2020), software development (Cosenz, (2017).

5.1. Sustainability Model

The SD sustainability model can quickly decrease the negative impacts on society, the environment, and customer behaviour. The business model can help decision-makers understand that BM can affect the natural environment, directly and indirectly, and impact customer behaviour for strategic formulation. It helps decision-makers create an environmental value proposition and value creation capacity for the problem of resource scarcity. In BMfS, the stock and flow diagram is different from other businesses from a stakeholder's perspective and is concerned with an environmental value proposition, ecological capital, value creation capacity, and value capture. BMfS provides a different feedback loop (environment – the decision-maker – business model) that can induce self-reinforcing ecological beliefs in the decision-maker and customer that lead to more sustainable business model development. The correspondence loop and balancing loop show the limit of the BMfS model in its growth by detecting counteracting balancing loops to foster sustainable development.

5.2. System Dynamics in Lean Manufacturing

SD in strategic formulation increases the manufacturing sector's efficiency, effectiveness, and productivity, profitability (liu et al, 2022), customer satisfaction, social transparency and addresses issues such as scarcity of raw materials, capital costs, energy, equipment, and greenhouse gas emissions. The increase in productivity occurs with an increase in production yields and outputs.

5.3. *System Dynamics In Government*

SD enriches the understanding and analysis of behaviour, relevance of system structure, and shared views of stakeholders in managing long-term governance strategies, both locally and internationally. It is also able to properly identify the proper strategic formulation to produce relationship correspondents.

5.4. *Social Dynamic Approach*

The next model needs a logical structure and qualitative study of dynamic social modelling, converting local information, past data, management factors, and performance targets to the mathematical diagram, correspondence graph, behaviour structure, and simulation model. The implication of the policy has dynamic complex system effects in helping young people with services in education, workshop, training, and employment and reducing the number of policy resistance. To conceptualise the system's dynamic complexity, it should develop a preliminary policy design to measure and simulate the model for policy improvement.

5.5. *System Dynamics in a start-up business*

SD modelling simulates the complexity of physical and social systems and provides a valuable methodology for supporting business models. The set of equations describes phenomena, map system structure, feedback interrelationship and communication loops, behaviour driving process, and complexity management system to help decision-makers understand business operation methodology and strategic business planning formulation. The alternative scenario helps entrepreneurs in exploring and understanding the assumption and perspective for many future prediction business conditions. Deep understanding should be explored in the complexity of DBM construction when the false impression usually develops in simple analysis and quick results and outcomes for highly complex business systems. The unpredictable, uncontrollable, and uncertain environment usually emerges in strategies, anticipated, and opportunities for new market development. To take advantage of the business model, reformulate possible scenarios and achieve new goals, it should adopt a rapid and flexible approach. In addition, it may help businesspeople interpret the results from these studies in their decisions in daily practice.

System Dynamics in the static business model canvas approach show a deeper interpretation and connection between business model variables or factors or dimensions. The ultimate business value is obtained from the interplay of key resources, processes, and stakeholders, which integrate the fundamental relationship between outcomes, outputs, and value drivers in System Dynamics. The ultimate innovation should have a value proposition in business operations that benefits the social and environmental world.

5.6. *Differences between Dynamic Business Models and Dynamic Performance Management*

In unpredictable and uncertain environments, the arising strategies may produce a prompt initiation of action to prosper from emerging opportunities in the business. Therefore, BM representations should adopt a flexible and rapid approach to reformulate BMs to get benefit from these opportunities, as well as to explore associated tactics and strategies to test their effectiveness in obtaining the new targets. By interpreting BMs as complex and dynamic systems, Demil and Lecocq (2010) remark that "firm sustainability tends on reacting and anticipating sequences of voluntary and new improvement, naming the label 'dynamic consistency' to this firm capacity to nurture and build its performance while changing its business model. In particular, with the intent to explore the business sustainability and the environmental impact of its operations, the approach suggested by Abdelkafi and T€auscher, 2016 and Zhou et. Al, 2022 aims at using SD (or better

System Thinking) to build and graphically represent partial BM causal-loop diagrams consist of : (1) the firm; (2) natural environment; (3) decision-makers; and (4) customers.

5.7. System Dynamics in Health Industry Management

SD contributes to the debate related to the adoption of new approaches and effective tools in the field of e-health by providing useful simulations for the effective decision-making of health care managers and decision makers for strategic planning and, therefore, prior to the start of investments and executive projects, especially in situations involving a lack of information, such as in less developed contexts, in which insufficient data can be obtained from previous application cases.

5.8. System Dynamics in Construction Industry

Despite the diversity and novelty of construction projects, the utilization of sophisticated quality management methods such as Total Quality Management (TQM) is lower. This study aimed to address the intricacy and causality resulting from implementing TQM in the construction sector, especially in developing countries, using the System Thinking approach

First, Dynamic Business Innovation Modelling has evolved as a key activity to reflect new business venture strategy by framing the way a firm will operate and how it will function in achieving its goals in Dynamic Performance Management such as: financial or economic (profitability, ROI, NPV, IRR, etc), productivity (efficiency, lead time, etc), environmental (energy saving, emission, etc), growth, innovation, social impact (CSR, Employee rate) (2018a). In the initial stage, start-ups experiment with their Business Models and, as a result, discover the most effective strategies, especially in terms of business sustainability and profitability (2018d). So a different Dynamic Performance Management measurement will produce a different Dynamic Business Innovation Model.

Second, Conversely, the DBM approach adopts a flexible and broader perspective on how a business works and produces value, which may also contain environmental and sustainability purposes. In addition, the possibility to simulate model behaviour over time may better contribute to fostering both the decision-making process and strategic learning (Aspara, Hietanen & Tikkanen, (2010). By adopting dynamic business model innovation (DBIM) as a strategy that will yield superior performance (DPM), other conceptual approach resists the idea that such innovation would have uniformly positive performance implications (e.g. Simpson et al., 2006). In any case, conclusive (empirical) evidence about the issue is sparse. Delays in adapting the business model will result in different management performance (DPM) results.

Third, about replication. A firm's approach to replication can be considered to be a highly important strategic decision related to that business model innovation (Aspara, Hietanen & Tikkanen, (2010). Specifically, once having discovered and refined a new business model, replicators may create further value 'by choosing the necessary components to replicate that model in suitable geographical locations' (Winter & Szulanski, 2001). Considering that a firm's profitable growth may, thus, benefit not only from the firm's initial innovations but also from their

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3 replication (Szulanski & Jensen, 2008), the lack of attention paid to replication in earlier research
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7 Forth, the DBM is a qualitative approach to designing BMs and, consequently, it allows
8 entrepreneurs to simulate the outcomes emerging from alternative strategies (Cosenz & Noto
9 (2018). Thereby, the emerging framework may effectively improve entrepreneurs' strategic
10 learning processes and, as a result, support them in designing more sustainable strategies (Boons
11 andLüdeke-Freund,2013). This responds to the need of adopting strategy tools able to experiment
12 with BMs to design strategies for management and change. The Ludwig's case study has illustrated
13 how to build a DBM, as well as the different outcomes achievable by setting and experimenting
14 with alternative investment policies through simulation. The different dynamic business models in
15 the company will perform different outcomes.
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19 Fifth, the research gaps by presenting an empirical study that examines the financial performance
20 implications of the strategic emphasis on business model innovation – as accompanied with vs
21 lacking the simultaneous strategic emphasis on replication. We also examine how the performance
22 management implications differ between smaller and larger firms (Aspara, Hietanen & Tikkanen,
23 (2010). The analysis of the differences in average profitable growth across firms that differ on the
24 relevant dimensions. For larger firms, the results indicate that a strategy that puts a high emphasis
25 on business model innovation but low or no emphasis on replication is associated with lower
26 average performance management than a strategy that does not pursue business model innovation
27 at all. Even a strategy with high emphases on both business model innovation and replication had
28 only marginally higher average performance management than a strategy that does not pursue
29 business model innovation at all. In other words, not all firms will be better off pursuing business
30 model innovation – traditional means of competing and doing business may yield equally good
31 results for many firms. The larger and the smaller companies will perform different outcomes in
32 Dynamic Performance Management.
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36 **6. Conclusions**

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38 Many businesses and industries reformed their business operation in the digitalisation era, including
39 business strategy, policy, administration, business process, and performance management (Cosenz,
40 Qorbani, & Yamaguchi, 2021). All of the papers in Table 1 applied the system dynamics modelling
41 approach. Some papers apply to business model canvas, sustainable business models, business
42 performance, and industry management. Many of the papers are based on the case study approach,
43 especially in start-up companies. One paper can develop a system dynamics modelling approach using a
44 literature study approach, but mostly, all of the papers have a contribution to Local and National Strategy
45 and Policy.
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49 The dynamic business model is very different from the static business model in terms of complexity
50 (detailed, complex, whole system), formality (graphic, mathematical, symbolic, measurement), flexibility
51 (anticipating, changes, reacting, emerging, uncertainty, unpredictability, uncontrollable),
52 capturing(phenomena, mapping, simulation, causal interaction), relationship (critical interdependency,
53 structure, relation, value creation), advantages (competitive advantages, innovation model, new goals,
54 updated information), perspective, and problem-solving abilities (changes integration). System dynamics
55 provides the integration of deeper insight, good representation, objective and subjective variables, detailed
56 analysis, possible alternatives, improved adjustment, and anticipated scenarios for making a better decision.
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3 The advantages of the system dynamics application can give subjective and objective information about
4 critical factors for decision-makers; direct and indirect impact for the customer; feedback to the
5 policymakers; identification of the origin condition; performance measurement for the stakeholders; share
6 new perspectives and insight; the needs of the new improvement; the limitation of the source; support for
7 the qualitative study; future graphics and simulation; assist better planning and goals; connecting all the
8 factors; social and environmental advantages; predicting some alternatives; and a learning process for the
9 whole system.
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11
12 Despite all of the advantages of system dynamics application, some constraints should be managed, such
13 as material feedback and export information to the suppliers; demand management; complexity or
14 complicated factors; restricted data; unrecognised problems; need to identify the assumption; adaptable and
15 adjustment situation; need for accuracy and validation measurement; more outcome observation; uncertain
16 and unpredictable environment; and the major complication of capturing reliable information on the
17 long-term results.
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19 20 21 **7. Future Research**

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23 The initial approach can be through a static system used in the canvas business model or other static
24 frameworks, but further developments can be continued with a dynamic system approach in developments
25 in business sustainability, lean manufacturing, family business, social service and enterprise, government,
26 and start-up businesses, etc. Although the empirical analysis here focused on the literature review, the
27 methodological insights and conclusions described in this paper can be explored in many contexts. Many
28 depth exploration have been conducted that can imply a SD approach to many new creative business ideas,
29 new invention and technology innovation, dynamic performance management tools and review, mental and
30 emotional entrepreneurship spirit, and material and physical limitation resources. As a decision support
31 system, the SD approach can provide intervention and challenge for scholars, business practitioners (small,
32 micro, enormous enterprise), researchers, government and policymakers, and educators in the beginning
33 (preliminary policy development) and the maturity phase of the activities. A dynamic focus in strategy
34 process model development and tools allow decision-makers to monitor consistency and decide to adjust
35 for their business profitably. Since the SD approach implied in the recent research is tremendously flexible,
36 the decision-support system-generated could be modelled with other equations.
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40 In the future, system dynamics application could explore some case studies, such as qualitative and
41 quantitative studies on some types of business. Startups, family businesses, government, social services,
42 sustainability and environmental businesses, and trading companies can all benefit from system dynamics
43 applications. The stakeholder can apply system dynamics application in business performance management
44 and can get a better understanding of the direct and indirect impact on the enterprise. This information is
45 critical for decision-makers, financial services, financial institutions, government agencies, consumers,
46 investors, shareholders, suppliers, etc.
47

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49 Based on this study, which shows that businesses are developing more towards digitalisation, wanting the
50 ability to keep up with the era that is moving so fast and the desire to increase profits, an instrument is
51 needed that can help describe the difficulties of the needs and developments of the future world. This
52 instrument, or tool of system dynamics, is also expected to assist in drawing future models and in building
53 a business with complex variables that can be predicted from the beginning.
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56 The start-up company's system dynamics performance business models and management can be used as a
57 case study, while government, business players, or decision-makers can be used for further study. Further
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3 studies and any of these statements should focus on providing many benefits and contributions to enrich
4 business research. The outstanding contribution could be applied to the local government of the country.
5 Any further study could be continued depending on the world situation, business situation, and business
6 trends.
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Table 1. A Connection Chart Between BMC and DPM (Federico Cosenz , (2017))

		BUSINESS MODEL CANVAS ELEMENTS								
		KEY-PARTNER	KEY-RESOURCES	VALUE PROPOSITION	KEY-ACTIVITIES	CHANNEL	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS	COST STRUCTURE	REVENUE STREAMS
DYNAMIC PERFORMANCE MANAGEMENT ELEMENTS	STRATEGIC	√	√						√	
	PERFORMANCE			√						
	END RESULT			√			√		√	√
	ACTIVITIES AND				√	√			√	
	PRODUCTS						√			√
	CLIENTS						√	√		√
	OBJECTIVES			√			√			

Table 2. Overview of the differences between a Static Business Model and a Dynamic business model of several factors

No.	Factor	Static Business Model	Dynamic Business Model
1	Complexity	The static business model provides a non-detailed picture (Massa et al., 2016)	The methodology of System Dynamic is a method for capturing the dynamic factors of complicated society and organisational systems (Forrester, 1961; Sterman, 2000). The dynamic business model provides a complex picture (Burton & Obel, 1995; Sterman, 2000; Rachmawati, 2022; Zhou et al, 2022; Varga-Csajkás et al, 2022; Song et. al.,2022; Liu et. al., 2022; Jing et. al.,2022; Colivicchi and Iannucci, 2022; Reike et. al., 2022).
2	Formality	Implicit, unformal (Massa et al., 2016)	Formalised in the diagram, design, mathematical, or symbolic modelling (Massa et al., 2016), and associated framework measurement (Bianchi, 2002; Richmond, 1997; Varga-Csajkás et al, 2022; Mismetti, et. al, 2022)
3	Flexibility	The perspective of conventional BM representations (Cosenz and Noto, 2018a)	Rapid and flexible approach (Demil & Lecocq 2010). Study unpredictability and uncertainty of enterprise fields. Predicting and proactively sort voluntary and arising adjustments (Demil & Lecocq, 2010; Chesbrough, 2010; Saraf and Shastri, 2022)
4	Capturing	To build typologies as a strategy for the coherence between critical enterprise framework factors (Demil & Lecocq, 2010)	System dynamic frameworks are produced for a particular managerial problem and constructed by figuring the enterprise system construction to create and convey an acknowledging of behaviour driving processes, also the measurement of the cause and effect interactions to generate a series of equations that placed the preliminaries for simulating feasible system behaviours over time (Warren, 2008; Varga-Csajkás et al, 2022; Koul et al, 2022; Riaz et. al.,2022; Khan and Hassan, 2022; Lane and Rouwette, 2022).
5	Relationship	Describing static relationship (Demil & Lecocq (2010)	Strategic Changes, arising opportunities value creation in the market. Structure the relation between critical interdependencies and value creation. (Demil & Lecocq, 2010;

No.	Factor	Static Business Model	Dynamic Business Model
			Chesbrough, 2010; Abdelkafi & Tauscher, 2016; Baden-Fuller & Haefliger, 2013; Loock & Hacklin, 2015; Perkmann & Spicer, 2010; Magretta, 2002; Rachmawati, 2022; Zhou et. Al, 2022;).
6	Advantages	Attractive insights (Demil & Lecocq, 2010; Chesbrough, 2010)	Achieving new goals or gaining sustainable competitive advantages. (Demil & Lecocq, 2010; Andries et al., 2013). Give new advantages to the entrepreneur via business model innovation based on updated information (McGrath, 2010; Cosenz & Bivona, 2021; Varga-Csajkás et al, 2022; Saraf and Shastri, 2022).
7	Perspective	Specific sectors of the main enterprise framework factors (Demil & Lecocq, 2010; Chesbrough, 2010)	Fulfil different functions (Demil & Lecocq, 2010)
8	Problem Solving	An effective way to analyse the consistency of a given firm (Demil & Lecocq, 2010).	To integrate change and ensure performance over time (Demil & Lecocq, 2010; Liu 2022; Varga-Csajkás et al, 2022).

Table 3. Comparison Study of System Dynamics Performance Business Models and Management

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
1	2016	Abdelkafi & Täuscher	Enterprise framework for Sustainability	A case study from Bettervest GmbH, a start-up from Germany, which was built in the year 2012	The framework links four sections: the company, the society, the policymaker, and the consumer. It describes the work of Business Models for Sustainability and how these firm frameworks can be started.	Four requirements were composed in the "Conceptual Development" context. Firstly, SD helps policymakers in acknowledging how the enterprise framework operates. Second, direct and indirect impacts through the customer's behaviour and the natural environment on the firm. Third, the critical factors are the company's value proposition and circumstances value proposition, which support the stakeholder's apprehension about the circumstances. Fourth, the framework illustrates critical feedback loops describing the logic of the stakeholder's view of BMfS.	The VBN concept does not encompass any social impacts or network links among people. It has proven that some consumers' decisions and executive or business activities are driven by social conditions, which are not within the final version. This research ignored the system characteristics that cause firms to illustrate and apply BMfS successfully.
2	2015	Asif et al	S.D. framework for Product multiple lifecycles	The literature review is based on a qualitative study	The modelling's main goal is to help decision-makers in the Product's Multiple Lifecycles (P.M.L.). The framework clearly	SD simulation delivers the decreasing dependency on the material that can gain strategically and make a company less inclined in material scarcity and	Decision-makers have to not make their regulations via the simplest estimating physical availability of substances. Additionally, they need to

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					reveals a connection among material reserve, supply, business achievement, and the requirement to adopt the Product Multiple Lifecycle theory.	charge volatility. In the same analysis, Sutherland et al. (2008) assumed that the reproduction of car machines can save energy by up to 90%. Hauser and Lund (2012) stated that reproduction could save energy and material in general, by up to 80%. Goldey et al. (2010) assumed that the reproduction of IT appliances decreases material and energy expenditure, reducing the greenhouse gas emissions effect.	consider other externalities that can save the material-producing nations from exporting materials to the global market. P.M.L. may be a model to reduce dependency on material assets. However, the most effective worldwide efforts can enhance the situation considerably
3	2015	Carmin Bianchi [6]	A dynamic performance approaches	The research of the municipality of Caltagirone, a little city in Catania county, Italia	The analysis reveals that Dynamic Performance Management knowledge can help local strategic planning by permitting policymakers to plan the short-term of a long-term plan. The other side assists the connection of strategic aims to appropriate goals achievement at gauging expected and arising targets.	The benefit of utilising this model is that it puts the achievement calibration within the wider perspective of the system (Bianchi, Winch, & Tomaselli, 2008). System dynamics (SD) modelling can enhance PM in local government to flourish a shared perspective of the relevant system's construction and behaviour among stakeholders in local blueprint arrangement.	There is a gap of reference discussing the particular complication of the field. First, the blueprint work is not ultimately focused on a single organisation but rather on a geographic area. Second, this needs management between different organisations and a result perspective to explore how adopted strategies will affect the area's achievement. Third, a trade-off analysis (in both time and place) is

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						<p>The SD method allows a construction-and-culture analysis based on which the strengthening circles underpinning development can be recognised and nourished by an appropriate improvement scheme. Also, strengthening circles can be coordinated with interaction balancing circles, which establish a source of limit to developing the explored system. By immediately discovering and against balancing circles, policymakers can nourish sustainable improvement.</p>	<p>required: a strategy might help local achievement in the short term, but it may also guide to unintended results in the long term. Fourth, the complexity mentioned above suggests the need for a feedback perspective. And a poor recognition of policy results.</p> <p>This work has no qualitative modelling to enhance the DPM method for the local blueprint program.</p>
4	2016	Carmine Bianchi, [7]	Young people service transformation in Applied Dynamic Performance approach	A case study for the Young People's council in Surrey County Council	This research has discovered a journal and practical model for creating a model to help decision-makers resolve.	A DPM diagram and an impact chart are translated into a quantitative system dynamics stock and flow simulation model using accurate local information to assist strategic studying, connection, and achievement governance. Such a framework establishes qualitative study and reasonable construction for the next modelling process. The qualitative system	This work is less detailed and has no quantitative analysis.

No	Year	Author	Research Area	Research Object	Conclusion	Benefit/Advantage	Limitation/Weaknesses
						<p>dynamics modelling approach and application of the whole DPM system. Qualitative modelling helps conceptualise a system's dynamic complication, augmenting previous policy models and improving more advanced simulation frameworks for calibration and strategic development.</p>	
5	2017	Federico Cosenz [8]	Supporting start-up business model design through system dynamics modelling	This research interviewed six young potential Italian businessmen for four hours for each meeting). They include a young potential Italian businessman, an I.T. student, and his software developer partner.	<p>The framework that connects technology invention and business performance consider the competitive dynamics, the effect of technology on firm framework creativity, and the operation of technology invention. This perspective discovers how the Dynamic Business Model may support potential businessmen with a lean performance approach and performance equipment to be applied even during the company's lifespan.</p>	<p>To overcome the above BMC shortages, the SD framework contributes a valuable methodological approach to the enterprise framework (Cosenz, 2015; Groesser & Jovi, 2015; Hajiheydari & Zarei, 2013). Following the SD approach, frameworks are based on a feedback perspective of enterprise systems, shown as a closed limit related to the investigated phenomenon.</p> <p>SD frameworks are important kits to assist knowledge and leverage the feedback connection of complicated administration systems. The frameworks</p>	<p>Considering the rivalry and other external power that impact a company's sustainability (e.g., previously restricted data) is foundational to the designing unpredictability and dynamic complexity that describe today's market segments (Demil & Lecocq, 2010). In this regard, the BMC is a static model and needs additional methodological assistance to better design such a dynamic complication. Additionally, the following important factors are still unsettled: what are the impacts of</p>

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						<p>also offer a work methodology to assist both enterprise planning and decision-making (Bianchi et al., 1998).</p>	<p>growth in key resources on key activities, the consumer base, charges, and incomes? Is there a linear or nonlinear connection between these factors? Is there any trade-off in organising a competitive advantage between the short and long-run? And how to successfully organise them? These problems restrict a comprehensive knowledge of how the enterprise is run and, as an outcome, do not nourish the strategic learning process of key players or third parties involved in the enterprise's improvement.</p> <p>Eventually, the B.M.C. fails in establishing a connection between the enterprise blueprint scheme and achievement arrangement and measurement. Brinckmann et al. (2010) underline that the form of a B.P. can be intended to impact a company's achievement, while</p>

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							Delmar & Shane (2003) irradiate a positive connection between enterprise planning and new company achievement. The illustration and application of a B.M. must be intended not only to inform and acknowledge how the company is intended to run and generate value to the prospective venture capitals, but also as a kit to be utilised regularly, adaptable to contextual adjustment, with the two-fold goal to develop entrepreneurial skill and arrange achievement (Berends et al., 2016).
6	2017	Federico Cosenz[9]	A dynamic business modelling approach to design and experiment with new business venture strategies	A case study of Ludwig, a start-up company, built in 2014 and domiciled in Palermo, Italy	The Enterprise Framework's key performance indicator is experimental skill and knowledge. Traditional approaches to designing a firm framework are still far from inclusive of the probability of fast experimenting with alternative strategies and investigating the related script in terms of	The dynamic Business Model result has been a complicated factor because Ludwig's founders at the beginning applied a linear, biased and static definition of the dynamics of Ludwig's business. Then they also identified it challenging to fully acknowledge the protocol underpinning the design of the DBM	The accuracy of the analysis made in constructing its DBM and measuring the systemic interrelationship among the framework factors. The prevailing references to simulation-based techniques propose that all frameworks are an imperfect description of the actual condition.

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					the ability to make a profit, arise, new creation, society effect, etc.	according to feedback loops (Torres et al., 2017). Groesser and Schwaninger (2012) remarked that user-friendly graphic illustration could create a wrong result by establishing the false image that the framework is an easy-to-use and speedy process. While some users usually find out challenging in structuring uncomplicated insight frameworks to reflect highly Convoluted systems of the enterprise.	Since they are constructed on the assumption, their validity depends on the extent to which these assumptions are matched (Richardson, 2013; Sterman, 2000; Morecroft, 2007). The identified assumptions on which a framework can be adapted in order to assess the sensitivity and consistency of an observed outcome to particular assumptions. Key findings from unassociated data systems can be consolidated into one framework as inputs or else for framework measurement.
7	2018	Federico Cosenz[10]	New Enterprise investor strategies by SD	A case study of Ludwig, a start-up company that was built in the year 2014 and domiciled in Palermo, Italy	Illustrate the operating enterprise and innovation for its stakeholders, e.g., firm venture and competition council have institutionalised Business Models' use to review a firm idea's validity and the generated profit to finance it.	1. Innovation through a fine-tuning process-oriented to support new market opportunities and/or strategy re-formulation, 2. In uncertain and unpredictable environments, arising strategies may inspire an immediate initiation of activity to foster from emerging opportunities in the market	The requirement to apply more applied skills and science to the DBM model and its success in delivering business initiatives and enterprise strategy framework that support problems for both students and practitioners.

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						3. BM should embrace a fast and adaptable theory to rearrange BM to take benefit of these opportunities and effectiveness in achieving new aims.	
8	2018	a.. Carmine Bianchi[11]	Lean Dynamic Performance approach by SD	A case study from Artisan, a new firm of the start-up, established company, and micro-giant firm	<p>This journal's conceptual model shows authentic empirical research to learn about lean, dynamic performance management systems that might support start-ups with a bunch of key performance motives that aid them in accentuating the right move in every of the four review criteria.</p> <p>A lean PM system in small and micro firms can combine the advantage of a structured with a flexible and selective approach. The 'lean' attribute is used here to characterise a different approach in applying PM to small and micro</p>	<p>System Dynamics modelling has been applied to help acknowledge: (1) how final outcomes can be influenced by achievement drivers; (2) how achievement drivers can, in turn, be influenced by the implementation of policy levers intended to affect strategic resource accumulation and depletion processes; and (3) how final-outcomes impact the flows of tactical assets.</p>	<p>The obstacles in devising and carrying through an appropriate review of the arising enterprise frameworks and recognising other options. This condition could be happened because of a shortage of well-developed skills in enterprise framework or simply the inherent problems in modelling this for a highly new invention and novel construction.</p> <p>Their value is restricted in terms of helping policymakers illustrate a critical character design over time and framing and evaluating the causal construction influencing them.</p>

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					firms compared to larger organisations.		
	2022	b. Peide Liu et. Al.	System Dynamics for supplier selection	Survey Subject-matter experts	The System Dynamics model for supplier selection was developed by considering profitability, productivity, social transparency, and customer satisfaction in three stages. First stages based on Theoretical Framework and Literature Review. Second stages Subjective model and third stages dynamic model of supplier selection.	System dynamics can asses indicator affecting supplier selection and provide a dynamic model for supplier selection. Finally System Dynamics help to achieve more competitive power and customer satisfaction.	For the good result, the data, information and the indicator, variable, factors should be updated.
	2022	Yuxuan Zhou	system dynamics in engineer-to-order supply chains industry	project-based production	SD develop and analyse an ETO Model by applying system dynamics and control engineering approaches. First, required to set the boundary and its positioning in the dynamics of production planning and control systems. Second, Define, analyse distinguished variables and features for an ETO	SD can develop an ETO Model which can automatically control the production to maintain the lead time, at the same time we conclude that holistic system level order book controller is much effective than a local controller in production planning and control.	Many assumptions about Capacity limitation and constraint. And the result of this research is only for the ETO Industry model.

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					archetype. Third, need to set the satisfies targeted system state requirements.		
9	2019	Federico Cosenz[12]	Support for sustainable enterprise models	A case study from Patagonia, a firm domiciled in Ventura, California, United States, and running a business in outdoor apparel and gear manufacturing.	The Dynamic Business Management for Sustainability theory may support decision-makers in creating sustainability-related goals built upon the core of worth invented by certain motives. So it can create the improvement of sector-specific or type-specific strategies for sustainability. Many manufacturing areas (e.g., electronics, clothes, and consumer goods) or sort of firms (e.g., start-ups, small and medium-firm, and large firms) respond differently to sustainability motives' achievement.	The main benefit of the DBMfS canvas depends on its dynamic origin, as against the naturally static level taken by the existent BM kits in the BMfS references (Dentchev et al., 2018). The proposed model also offers a consolidated perspective of the main concept of value proposition, basically constructed on the connection between value drivers, production, and results. The logic of all these management kits for modelling BMfS depends on the concept that the important innovation must be mobilised towards creating social and/or environmental advantages in enterprise management, therefore shifting the centre of the value proposition to the community and the circumstances.	First, the approach of the DBMfS theory still does not permit the quantitative model's management. Second, although the model example nurtures a developed understanding of the model, the empirical approach should describe the framework's validity. Third, the particular kinds of information that are required to be illustrated in the framework, each one of the BM elements, are still not determined and require further refinement. Specifically, the feasibility to measure and simulate a DBMfS is quite difficult due to the major complication of capturing reliable information on the long-term results (i.e., sustainable value) created by a system.

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10	2020	Marques	A dynamic family enterprise accretion	Seven experts from many business backgrounds (i.e., automotive, accounting, team building, and industrial and electronic equipment trading).	A black line shows the beginning framework. The outcomes show that four sectors have the best increasing centrality worth, namely: (1) Psychosocial criteria; (2) Firm Policies and Management; (3) Connections or linkage; and (4) Family sectors. The effect of the improvement is a factor in the framework as a whole"	The decision support system generated involved both subjective and objective factors, which generated a clear, simple reflection of the understanding acquired from the panel of experts gathered for this research. The proposed methodology permits small-enterprise executives to predict alternatives and make better conclusions. Naturally, the proposed model's idiosyncratic origin requirements must be taken into consideration as it does not permit for Extrapolations without the needed adaptations.	The methodologies applied were subjective and context-dependent, so ultimate warning is required when extrapolating the outcomes achieved. Despite these constraints, this research's findings offer a critical approach and practical contributions that can further the improvement of the affiliated reference. On a theoretical level, the proposed FCM-SD model is process-oriented and constructivist, indicating that the proposed system can be applied as a learning process.
11	2022	Vecchio	System Dynamics for E-Health Management	ICU Patients in hospitals in the adoption of Electronic Health Records (EHR)	SD contributes to the debate related to the adoption of new approaches and techniques in the field of e-health by providing useful simulations for the effective decision-making of health care managers and decision makers.	The adoption of an SD approach as a quantitative forecasting method able to evaluate the effects of digital health care on humans with the standards of organizational efficiency represented the main contribution offered by the study to the advancement of research	With the adoption of IT systems containing a large amount of information and personal data on patients, new opportunities have emerged, as well as new challenges. The awareness issues of privacy in computer data are significantly evolving

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					<p>Even more important is probably the emerging evidence of its applicability in strategic planning and, therefore, prior to the start of investments and executive projects, especially in situations involving a lack of information, such as in less developed contexts, in which insufficient data can be obtained from previous application cases.</p>	<p>and practice and highlighted the benefits of its adoption for the optimization of e-health services.</p>	<p>the organization's laws and regulations must adhere. The limitations alongside its advantages regarding new assessment scenarios: are its scalability, the ability to extend the model both regarding hospital structures and wards and toward other healthcare delivery methods, and the possibility of integrating additional variables to simulate the adoption of further technologies or effects resulting from their implementation that have not yet been considered.</p>
	2022	Peijiang Liu	Diseases SARS-CoV-2 management	Theoretical Study	<p>Conclusion and solutions are obtained for various arbitrary parameter counts. Specific vaccine procedures and treatments for infectious diseases are very important as the process of receiving vaccinations are seen as effective tools for eradicating</p>	<p>The system dynamics can explore more the deep problem of Sars-Cov-2 about increasing population density of affected disease, the trend of the human behaviour with the infected disease, dynamic of infected population, what is the influencing factors with the declining number of the infected human population, how many</p>	<p>The data and information should be accurate and sufficient enough to execute Sars-Cov-2 Research. the results of the model using the generalized derivatives are much more precise and more accurately describe real-world phenomena.</p>

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					SARSCoV-2 in the human community.	people have received vaccination and what is the effect after getting vaccinated.	
12	2022	Hassan Riaz et. al.	Construction	Respondent (preliminary questionnaire survey and a detailed questionnaire survey).	Pave the way for creating a strategy or policy or quality-oriented environment, which is more feasible for Total Quality Management implementation and enhances the quality performance of construction projects in developing countries.	<p>The SFD was developed to connect causal relationships and polarity and subsequently used to develop the SDM. Top management commitment, continuous improvement, and quality of education regarding TQM and the TQM (converging stock) were specified as four notable stocks of this SDM. The combination of influence matrix, CLD, and SFD assisted in developing the SDM simulated through VENSIM</p> <hr/> <p>software over five years. Over time, the existing three accumulated stocks under the influence of reinforcing interrelationships illustrated exponentially increasing behaviour of the TQM as the converging stock</p>	System Dynamics Model is not applied to real projects/case studies in both developed and developing countries which can compare the results and advance the body of knowledge.

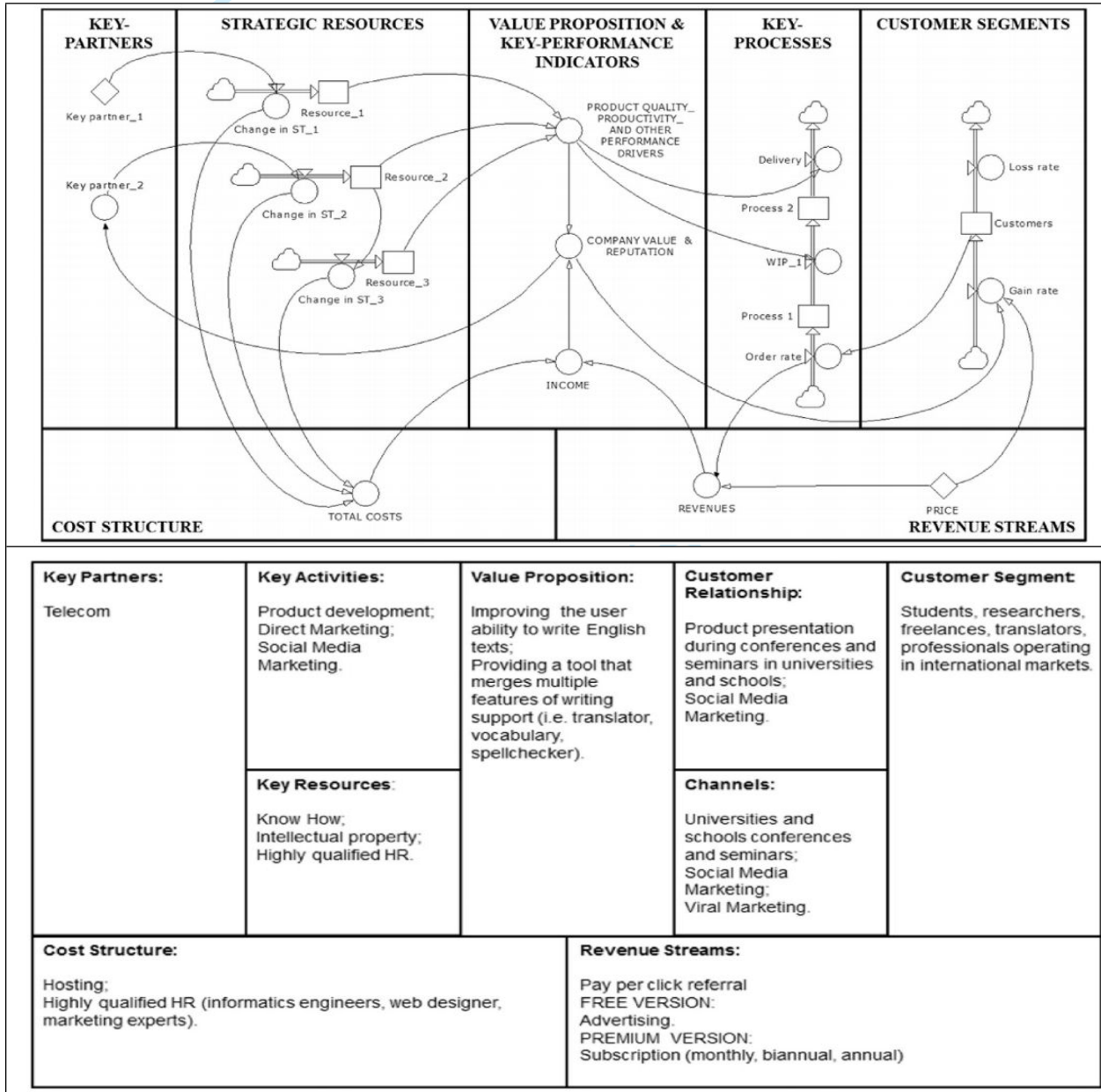


Figure 1: The Dynamic Business Model framework structure adopted from Ludwig's B.M. Canvas (Cosenz and Noto, 2017)