**Journal of Electronic Commerce in Organizations**
Volume 20 • Issue 1

# Applying a Structured Industry Model Development Process to Support Digital Transformation Efforts:
## A Case Study of the Online Learning Industry

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## ABSTRACT

While business models transformed how we describe organizations, the authors apply equivalent modeling to describe industries. Specifically, the authors propose and implement a structured industry model development process (SIMDP) based on the design science research methodology (DSRM). Moreover, the approach conceptualizes an industry model scaffolded through academic research and managerial guidance. An industry model creates a holistic view of any target industry to 1) guide digital transformation efforts, 2) reveal model components and linkages that may not be immediately evident, and 3) support strategic decision making within organizations considering the expansion and refinement of existing business models. The authors demonstrate the SIMDP's efficacy using a case study of the online learning industry and evaluate the resulting industry model. Finally, the authors suggest future research directions and discuss the practical implications of the SIMDP and its resulting artifacts.

## KEYWORDS

Business Model, Design Science, Development, Digital Transformation, Industry, Iterative, Online Learning

## INTRODUCTION

Changing customer expectations, fierce global competition, and rapid technological evolution have encouraged organizations in nearly every industry to respond by implementing digital transformation efforts. Digital transformation is "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies (Vial, 2019)." Such transformation efforts attempt to integrate digital technology throughout an organization's core to remain relevant and maintain stakeholder value (Kim, 2020). Unlike digitizing and improving an organization's *process model*, digital transformations attempt to digitize and improve the organization's *business model*. Far from moving services online (digitization) or IT-enabled process improvements (digitalization) (Venkatesh et al., 2019), digital

DOI: 10.4018/JECO.292475 *Corresponding Author

transformation is "a planned digital shock to what may be a reasonably functioning system" (Andriole, 2017, p. 2). Therefore, such transformation efforts effectively redefine the organization itself.

While some organizations have been reluctant to consider digital transformation due to the costs, talent shortages, and necessary cultural changes within the organization, the COVID-19 pandemic has demonstrated the benefits of effective digital transformation. For example, adopting digital business components prepared existing retailers with mechanisms to provide products during mandatory closures and stay-at-home orders that constrained physical shopping. However, digital transformation is not only about brick-and-mortar industries. Digital transformation efforts should not be constrained to organizations that have been slow to adopt digitization as such transformation can also benefit IT-enabled organizations that seek to remain relevant. For instance, a logistics provider may consider expanding into new markets by developing partnerships with sharing economy platform providers (e.g., Uber). Other IT-enabled industries, such as those grounded in e-commerce, also benefit.

While e-commerce organizations rely on a digital foundation, such organizations are not impervious to the need to consider ongoing digital transformation at the strategic level (e.g., Reinartz et al., 2019). Therefore, much digital strategy, transformation and business model research is in the context of e-commerce (e.g., Hansen & Sia, 2015; Kim, 2020). Contemporary e-commerce organizations might even consider creating 'virtual' organizations, supplemented through various digital partners, instead of attempting to control all organizational aspects (Simmons et al., 2013; Zott & Amit, 2013).

## Business Ecosystems and Digital Transformation

Reimagining organizations into the digital age – digital transformation – has revitalized the need for effective business models. Digital transformation goes beyond aligning IT initiatives with business strategy. It involves creating a digital business strategy and infusing technology when executing the strategy. Organizations can effectively reinvent themselves by embracing digital strategy and fostering an ecosystem of partners. While businesses and industries predominantly relied on internal capabilities, digital strategies have fostered an era of businesses and industries spanning traditional boundaries. Organizations frequently seek digital transformation to remain relevant and deliver value in today's fast-paced business environment. These efforts involve strengthening an organization's dynamic capabilities, focusing on a digital-first strategy, and leveraging an ecosystem of partners (including competitors). Nevertheless, most digital transformation efforts ultimately fail (Hinterhuber & Nilles, 2021; Tabrizi et al., 2019). These failures may be because organizations often lack the tools necessary to plan effective digital strategy and transformation. For instance, traditional business modeling focuses on the existing and potential business elements and inherently ignores potential boundary-spanning capabilities found in the broader business ecosystem. This may be a critical oversight as open innovation and connecting innovations to an ecosystem are hallmarks of successful digital transformation (Hinterhuber & Nilles, 2021). While traditional business models might consider partnerships and alliances, digital transformation radically expands this notion and encourages developing an ecosystem of capabilities (Kotarba, 2018). For instance, Netflix utilizes Amazon Web Services (AWS) – a competitor's service – for most of its computing and storage (Amazon, 2021). Such innovative approaches are often a hallmark of effective digital strategy – as a partner ecosystem is considered one of the pillars of digital transformation (Talya & Mattox, 2016).

## Business Models

A business model is an ever-evolving tool for depicting, innovating, and evaluating business logic (Foss & Saebi, 2017). Digital transformation requires strategic planning and updated business models to remain feasible and economically viable (Berman, 2012; Bharadwaj et al., 2013). Business models are critical for examining digital and IT-enabled industries (Foss & Saebi, 2017). Therefore, an organization that aims to reinvent itself as a digital organization should have a clearly defined business model. Moreover, business models offer an abstract view of an organization's critical success factors,

business processes, and financial flows (Magretta, 2002). Additionally, business models influence an organization's competitive advantage (Purkayastha & Sharma, 2016). Business models provide an effective method to describe the strategically interconnected components of organizations (Zott & Amit, 2013). Simple, logical, measurable, comprehensive, and operationally meaningful business models present a useful abstraction of the components and fundamental value creation mechanisms within an organization (Morris et al., 2005). However, there is no clear consensus on how to create effective business digital business models as frameworks recommend various approaches (e.g., Osterwalder & Pigneur, 2010).

While business models capture the unique components of an organization, and in most cases, how the organization interacts with other organizations, such approaches rely on *divergent* thinking. In other words, an organization's business is illustrated starting with the standard model components before adding new digital components. Furthermore, the well-known modeling frameworks (i.e., Business Model Canvas [Osterwalder & Pigneur, 2010]) lack relational and process-oriented attributes (Fielt, 2013; Pozzi et al., 2016). Such characteristics are essential for digital strategy digital transformation (Sathananthan et al., 2017). Conceptualizing digital transformation requires the successful integration of model components (Hansen & Sia, 2015; Osterwalder & Pigneur, 2010). To ensure that strategic decision-makers consider all opportunities afforded to them, we propose developing such models using a *convergent* approach. Instead of modeling the organization first, our approach presents decision-makers with a holistic view by modeling the target industry. Surprisingly, while an industry perspective provides valuable information to support digital transformation, academic research into ecosystem or industry-level modeling is scarce in the management, marketing, and information systems literature.

## Why Model an Industry?

Examining only intra-organizational model elements limits opportunities to identify new business partnerships (e.g., by seeking external organizations to provide essential model components), support digital transformation (e.g., by helping to identify unimportant or unnecessary model components), or detect new business components (e.g., by identifying new target customers). While such opportunities can be identified using traditional approaches – starting with an existing model or brainstorming a new model then identifying transformation opportunities – we propose modeling the industry ecosystem first then working inward (e.g., converging) to identify a suitable model. Developing industry ecosystem models provides several additional benefits, such as 1) creating a holistic view of an industry, 2) emphasizing overlooked business components, 3) providing a starting point for organizations considering a 'pivot' or other business model enhancement, and 4) providing a comprehensive representation of other, perhaps competing, or complimentary, business models. Therefore, specifying an industry model supports digital transformation by facilitating the forging of digital strategy and the identification of cross-industry partnerships.

An industry model's primary value is that it provides a method for visualizing and conceptualizing model elements unique to an industry. Moreover, an industry model can facilitate business innovation, differentiation, and optimization (key tenants of digital transformation). Another advantage of an industry model is that such models can define a shared language to describe the model elements within and external to an organization. In other words, an industry model provides an ontology for improved dialogue and sensemaking when working with external partners. Consequently, an industry model must be specific enough for an organization to describe its unique internal model components yet expansive enough to capture the model components of external organizations. Furthermore, by modeling at the industry level, organizations can recognize opportunities and weaknesses that may not otherwise be clear. This benefit is significant as managers often examine the business environment through biased views (e.g., Brescoll, 2016).

We propose a novel approach for identifying and classifying the model components at the industry level to maximize industry model benefits. Specifically, we aim to develop and validate a modeling process grounded and aligned with rigorous design science standards. Informed through academic

research and industry validation, we believe that our approach can identify business components in any industry. This leads to the research questions:

RQ1) How can business model components be specified using a convergent process?
RQ2) How feasible is a convergent process for identifying business model components within a target industry?
RQ3) Can industry models create a shared ontology among diverse organizations to assist digital transformation efforts?

To answer these questions, we create a convergent modeling process based on design science approaches (Section 2). We then apply our process using an illustrative case of the online learning industry (Section 3). Next, we discuss our findings and present academic and managerial implications (Section 4) before concluding (Section 5).

## A DESIGN SCIENCE APPROACH

Design science refers to creating innovative artifacts and phenomena contributing to productive and practical applications (Hevner et al., 2004). Iivari (2015) proposes two different design science strategies. The first strategy involves developing an artifact for a client's specific problem. For the second strategy, "… a researcher constructs an IT [information technology] meta-artefact (Iivari, 2003) as a general solution concept (van Aken, 2004) possibly to be instantiated (March & Smith, 1995) into a specific solution concept (van Aken, 2004) or a concrete IT artefact (application) to be adopted and used in a specific context." (Iivari, 2015, p. 107). It is the second strategy that inspired our process design. Additionally, the design science research realm has identified multiple potential genres (Peffers et al., 2018). The genre that aligns with the goal of our inquiry is the design science research methodology (DSRM). DSRM emphasizes the design and construction of practice-applicable artifacts, such as systems, applications, and methods, that could potentially contribute to the efficacy of technology in organizations (Peffers et al., 2007). DSRM does not demand that a design is based on a formal theory (i.e., literature) or that artifact evaluation involves a formal process embedded in the design effort (Peffers et al., 2018).

Researchers have applied the DSRM to various contexts, including software development and organizational advancement (Mohrman, 2007). The DSRM evolved as a complementary research method to the abundant behavioral and economic approaches (Vaishnavi & Kuechler, 2015). The DSRM is particularly valuable when seeking to develop IT artifacts and impose academic rigor even when theoretical support is elusive (Hevner et al., 2004).

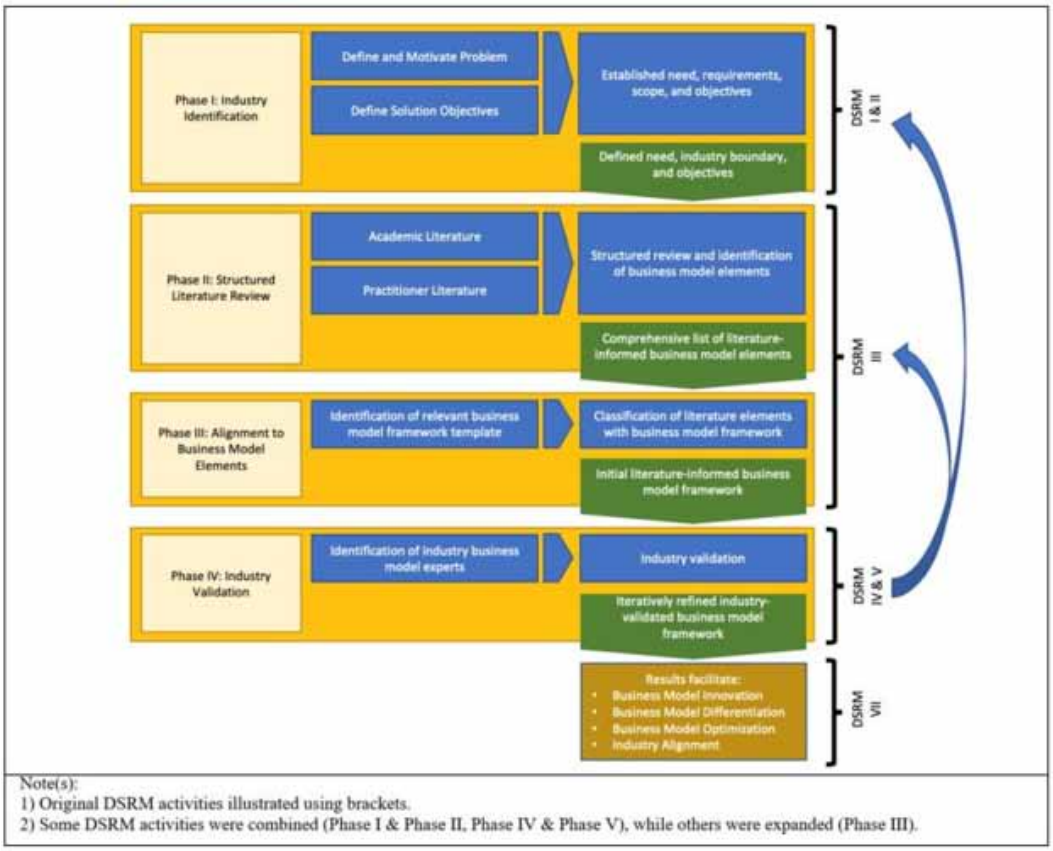
The primary contribution of our study is the application of the DSRM to create an industry model. Moreover, we modify the phases, intentions, and outcomes of the DSRM activities to align with industry needs. Figure 1 shows the proposed structured industry model development process (SIMDP) aligned to the DSRM activities. We describe these phases next.

Peffers et al. (2007) propose activities to identify and motivate the solution (DSRM Phase I) and define the solution's objectives (DSRM Phase II). We merge these activities into a single phase that we refer to as the *industry specification*. This merged phase of the process also ascertains the need for an industry model and defines the scope and boundary of the target industry. This phase also encompasses the identification of the requirements and the meta-requirements of the model.

While Peffers et al. (2007) suggest a single design activity (DSRM Phase III), we expand the activity into two distinct phases: a) a *structured literature review* and b) an *alignment to model elements*. The structured literature review phase scans academic and managerial publications to identify model components. Using well-defined approaches for conducting structured literature reviews can reveal an exhaustive list of potential model components. The alignment phase involves associating each

identified model component to well-established model frameworks. The result of the alignment phase is an initial industry model artifact.

**Figure 1. Structured industry model development process (SIMDP)**




Note(s):
1) Original DSRM activities illustrated using brackets.
2) Some DSRM activities were combined (Phase I & Phase II, Phase IV & Phase V), while others were expanded (Phase III).

Subsequently, an *industry validation* phase elicits feedback from industry experts to determine the validity and value of the model. This phase encompasses activities from Phase IV and Phase V of the DSRM. The industry validation phase also provides an opportunity for iterative changes and additions to the model based on industry guidance. While the communication of the artifact is a DSRM activity defined in the Peffers et al. (2007) process, we do not explicitly include this as an activity in the SIMDP. The following section describes how we applied the SIMDP to develop an industry model.

## APPLYING THE SIMDP: AN ILLUSTRATIVE CASE

To demonstrate the SIMDP and evaluate the value of the resulting industry model artifact, we apply our proposed process to the online learning industry. We believe that this case will enable the reader to determine the efficacy of the process and evaluate the artifact. The online learning industry presents an excellent candidate for this case. Moreover, the online learning industry is a) ambiguous and difficult to define, b) consists of a complex network of legacy and digital organizations, c) delivers value to various stakeholders and customers, and d) presents ample opportunities to link model components

using technologies. The online learning industry is well documented in the academic literature and managerial publications (supporting Phase II of the SIMDP). Furthermore, the researchers had access to industry leaders (supporting Phase IV of the SIMDP).

## Phase One: Industry Specification

Some believe that online learning will ultimately democratize education by providing ubiquitous access to anyone with an Internet connection, ensuring scalable education systems that reduce the need for maintaining low student-to-teacher ratios, thereby reducing delivery costs. The COVID-19 pandemic has pushed education into online arenas as numerous schools closed their doors. The value of digital transformation for education is no longer debatable; instead, organizations seek digital strategies to prepare for world-altering disruptions like a pandemic.

However, many of these transformations were unsuccessful (Spector, 2014). While the potential of digital transformation in education has become popularized, most educational organizations, platform providers, and content developers have struggled to find reliable business models (Fischer et al., 2014; Taran et al., 2016; Valentin, 2015). Thus, we find ample evidence for the need to model the online learning industry.

## Phase Two: Structured Literature Review

We conducted a systematic literature review to inform the development of an industry model. This literature review involved exploring the terms 'digital learning', 'eLearning' or 'online learning' and terms describing online learning modalities (e.g., 'self-paced online courses'), along with 'models,' including logical variations and derivatives of these terms. We used Google Scholar and EBSCO Business Source Premier to identify 96 relevant studies. We examined each study to distill relevant model components. Moreover, we extracted 53 components from the literature. The following section describes how each component was added to a model framework and classified into model elements.

## Phase Three: Alignment to 'Generic' Model Elements

In the third phase of the process, we classify our components into relevant framework and model element classifications. We considered processes used to develop business models according to well-regarded frameworks and elements (e.g., pricing model, value proposition). The classification of components into their elements allows for their structured description, an essential task when developing a shared ontology. Most online education business models utilize frameworks consisting of strategy, value creation, revenue model, and value proposition (i.e., perceived customer value) (Al-Debei & Avison, 2010; Clauss, 2017). Therefore, we classified the components into these relevant framework categories. The following sections summarize our findings by this framework classification.

### *Revenue Model*

The revenue model suggests that revenue streams, sources, and forms are essential and warrant further exploration (Asfoura et al., 2009; Foss & Saebi, 2017; Osterwalder & Pigneur, 2010) along with cost structures and pricing models of the associated revenue streams (Foss & Saebi, 2017; Osterwalder & Pigneur, 2010; Schief & Buxmann, 2012). Potential online learning revenue streams include program management, tuition, secure assessments, platform development, certification, advertising, and matching students with employers (Belleflamme & Jacqmin, 2016).

### *Value Proposition*

The value proposition requires the development of a strategic value proposition aligned to customer perceptions. Depending on the online learning organization, such customers can be other organizations, educational institutions, or individual learners. A value proposition includes factors related to the offering and unambiguously defines the product or service (Bocken et al., 2014; Morris et al., 2006).

Relevant online learning product offerings could include delivery platform licensing and content creation. Services can include course facilitation, course maintenance, completion certifications, and shared and reusable course components.

### *Value Creation*

Value creation includes service and production models (Bocken et al., 2014). Within online learning service models, the training of facilitators and mentors, student records management, and course development are value creation components. When learning objects are developed strategically, their value is maximized through potential re-utilization across courses, programs, and institutions. Thus, organizations must decide if they seek to produce reusable learning objects at a higher initial cost or produce non-reusable learning objects (Kurilovas et al., 2014). Thereby, partner orientation plays a significant role in value classification. It describes the partner's core competencies that impact partner integration and the distribution of products and services. A sustainability analysis component is also essential to the value creation classification (Bocken et al., 2014). Such an analysis ensures that the product or service are scalable and sustainable (Bernardin, 2014).

### *Strategy*

Strategy emphasizes the importance of multiple elements: a) market segments, b) market factors, c) strategic partnerships, d) competitive strategy factors, e) economic factors, and f) growth factors. Identifying appropriate online learning market segments could lead to specifically targeted offerings toward organizations and industries, educational institutions, or individual learners (Asfoura et al., 2009). Educational institutions' target markets may include products (i.e., learning platforms) and services (i.e., remedial course delivery). Market factors are essential for understanding individual organization and learner differences. Strategic partnerships provide advantages such as a stream of customers (e.g., future learners), subject expertise for course development, or share the cost burden of developing content. Developing a competitive strategy presents an opportunity for organizations to identify gaps in competitive market offerings. Finally, organizations must address growth factors to determine new market opportunities and understand existing market opportunities (Bocken et al., 2014; Osterwalder & Pigneur, 2010).

### *The Initial Industry Model Artifact*

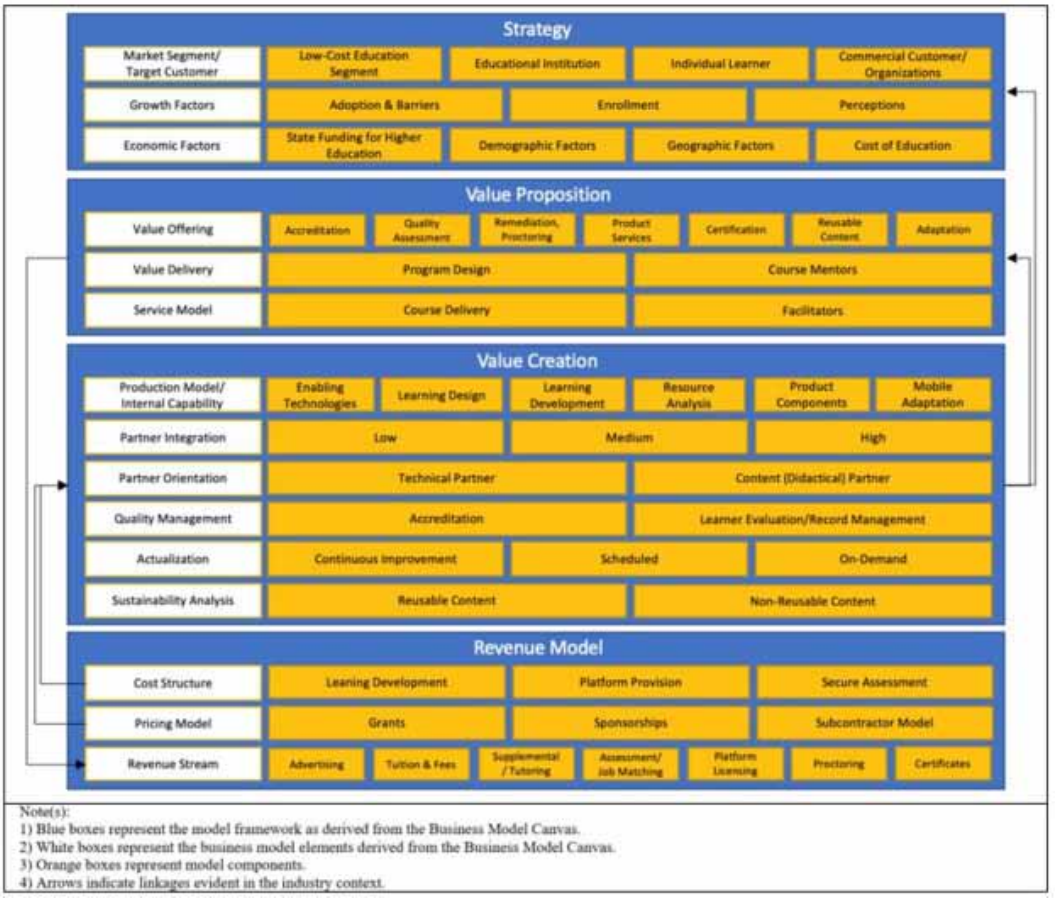
By identifying model components and aligning them with a relevant model framework, researchers and industry leaders can recognize industry gaps and develop novel business model capabilities. Figure 2 shows the categorization and alignment of the model components. This model depicts significant relationships among the core elements of the online learning industry model.

Our analysis provides a novel presentation and description of the industry model framework, elements, and components. While the model framework and elements appear universal, each industry analysis may determine the most appropriate framework application. While the initial alignment is based on the literature, the lack of significant prior research and the evolving online learning landscape demands that these concepts be validated.

## Phase Four: Industry Validation

Ten iterative semi-structured expert interviews with executives of relevant target companies were conducted (e.g., Blank, 2013) for the *industry validation* phase. Subjects representing major online learning organizations were selected through two (US and European) non-profit eLearning conference participant lists. All subjects were assured confidentiality. Table 1 provides the list of organizations sampled. The iterative feedback approach allows for identification of missing or misaligned model elements.

**Figure 2. Initial results of the structured industry model development process (SIMDP) for the online learning industry**




Note(s):
1) Blue boxes represent the model framework as derived from the Business Model Canvas.
2) White boxes represent the business model elements derived from the Business Model Canvas.
3) Orange boxes represent model components.
4) Arrows indicate linkages evident in the industry context.

**Table 1. Participating Organizations**

| *ID* | *Domain* | *Organization Type* | *Target Market(s)* |
|---|---|---|---|
| Org1 | Higher Education Technology Leadership | Not-for-profit | Global |
| Org2 | Educational Technology | Private | Global |
| Org3 | Online Learning | Public | USA |
| Org4 | Technology Research, Consulting | Public | Global |
| Org5 | Online Learning | Private | Europe |
| Org6 | Online Learning | Private | Europe |
| Org7 | Competency-Based Education | Not-for-profit | USA |
| Org8 | Education Provider | Public | USA |
| Org9 | Educational Content Developer, Services | Private | Global |
| Org10 | Educational Content Developer, Services | Public | Global |

An experienced research team, informed through the literature review, developed a questionnaire to assess the industry model. Subjects read through the questionnaire and inspected the industry model artifact before the interview. We asked interviewees to determine if the model components were relevant to their respective organizations and the overall online learning industry. Interviewees could provide feedback and practical examples regarding each component. This presented an opportunity to evaluate each component independently. This process assessed the SIMDPs practical relevance and enhanced the derived model by identifying missing components. Most subjects indicated that every model component identified through the literature was representative of the online learning industry. While this indicated validity of the model, some elements might have been inadvertently excluded (as they are not in the literature). Therefore, a two-person team captured additional responses via subsequent telephone interviews. Three independent raters evaluated the interview notes for critical themes. Most interviewees agreed with the industry-level model components and their categorization into the four main framework pillars and respective elements.

### *Feedback Regarding Strategy Classification Components*

While most executives agreed with the strategy classification components, there were concerns regarding the *commercial customers/organizations* and *state funding for higher education* components. Organizations that develop online learning content and technologies (Org3, Org5, Org 6) indicated the importance of including industry as a key market segment of the strategy classification. Furthermore, Org5 and Org6 mentioned that the industry and corporate training stakeholders were usually more willing to adopt online learning than post-secondary educational institutions. Furthermore, a technology vendor (Org3) identified fewer barriers to implementing and adopting online learning in the corporate training context. Nevertheless, Org8 stated that the *commercial customer/organizations* component was unclear and too broad, suggesting separate components to capture *corporate training* and *associations* separately. Our industry model was updated to identify *professional industry associations* as separate model components in the market segment/target customer element based on this feedback. Within the *economic factors* element, the *state funding for higher education* component seemed unclear to the non-US organizations (Org5, Org6), prompting further discussion. Org5 suggested *grant funding* as an additional component. The researchers replaced the *state funding for higher education* component with a general *external funding* component. All organizations agreed with the remaining market segment, growth, and economic factors found in the literature.

### *Feedback Regarding Components within the Value Proposition Classification*

While most agreed with the value proposition classification, there were concerns regarding the *remediation/proctoring* component and indications of missing components. Most interviewees indicated that the *remediation/proctoring* element is not of high importance to the industry model (Org1, Org3, Org4, Org5, Org6, Org8). Proctoring services are reaching "a ubiquitous, commodity-like state" (Org2), indicating that such services did little to enhance a business model's value proposition. Furthermore, one subject mentioned that "high-quality course and assessment design potentially eliminate the need for proctoring to ensure academic integrity" (Org8). The researchers elected to separate the proctoring concept from remediation and label it more broadly as academic integrity to address this reaction. The *academic integrity* component would continue to encompass proctoring services and all services designed to ensure or enhance academic integrity, such as plagiarism detection services.

Several organizations felt that the value offering elements were incomplete or too narrow (Org2, Org3, Org5, Org6). Org3 suggested to expand the value proposition aspects to better capture the "benefits of connecting global stakeholders in terms of collaboration and content sharing." As peer networks are influential when selecting educational opportunities, the researchers elected to include *peer networking* as a value offering component in the revised industry model. Furthermore, Org3 mentioned the "benefits of accessing learning resources anytime and anywhere." Org5 and

Org6 echoed these sentiments and stated the importance of open and ubiquitous access to forms of online learning. Moreover, many, but not all, online learning models imply asynchronous learning environments. Thus, included *asynchronous learning* as a unique value offering component.

Finally, Org2 suggested that "providers should offer their customers not only the learning content but also a model to bridge the gap between content and understanding." Upon further probing, it became evident that Org2 was advocating for highly compartmentalized and verified learning environments. Such concepts, often referred to as 'microlearning,' allow organizations to prime individuals before offering instruction or allow employees to "actualize learning in safe environments," as described by Org2. Therefore, *micro*-learning was included as an independent component within the value offering classification. While many (Org2, Org3, Org5, Org6) had comments regarding the value offering classification, all agreed with the value delivery and service model components identified in the literature.

### *Feedback regarding Components within the Value Creation Classification*

The organizations generally agreed with the components within the value creation classification. However, there were concerns about the *non-reusable content* and a lack of *adaptive learning* and *content curation* components. While the initial survey revealed support of the *non-reusable content* component, no organization indicated the importance of *non-reusable content*. According to interviewees, the *reusable content* and *mobile adaptation* components are most relevant (Org1, Org2, Org3, Org4, Org6). Moreover, Org4 stated that reusable content was a "core differentiator from traditional post-secondary learning" development.

Two executives (Org5, Org6) stated that an elaborated and adaptable learning platform would create additional learning content value. These organizations referred to 'adaptive learning,' in which a system selects learning content and approaches most applicable to the learner and the learning context. Though adaptive learning was attempted to be captured within the *content development* and *enabling technologies* components, our subjects recommended that we add *adaptive learning* as a distinct component. Additionally, several suggested that high-quality content already exists and needs to be captured and reprocessed to fit online delivery formats (Org1, Org2, Org9, Org10). Such content would need to be indexed, licensed, stored, and adapted to work with various platforms. Thus, *content curation* was added as a component of internal capability. The organizations agreed with the remaining components and their classifications.

### *Feedback regarding model components within the revenue model classification*

Two subjects indicated that revenue models and online learning might not represent accurate alignment (Org1, Org8). These executives considered online learning as an open enterprise providing free educational opportunities to the learner. The organizations represented by them were not-for-profit (Org1) and a public educational institution (Org8). They recommended that indirect costs should be specified more clearly as "indirect costs are often ignored in education" (Org1). While the literature did not identify indirect costs, many educational organizations do not adequately capture indirect costs associated with new educational initiatives (Org1). This subject stated that one firm's successes might not be replicable due to different or incompatible cost measures. Feedback suggested a need to balance free education and those with costs (i.e., freemium pricing models) for practitioners electing to use the industry model (Org9, Org10). *Freemium* was added as a new component in the pricing model.

### *Finalizing the industry model*

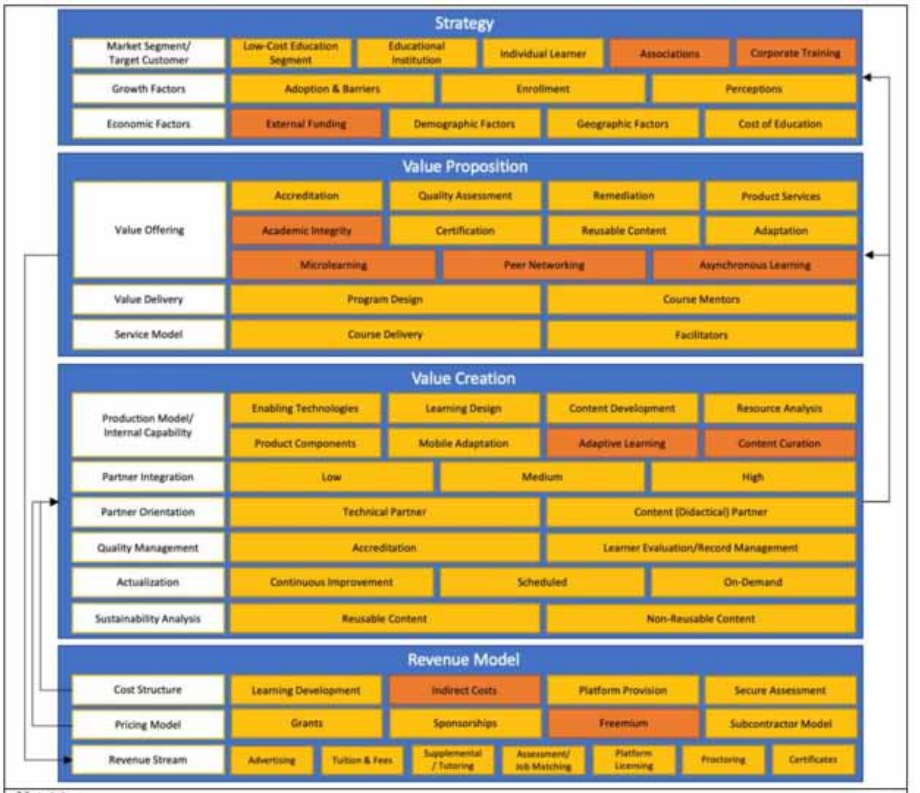
The feedback suggested some changes to model component labels and granularity. Following DSRM, which recommends concluding interviews once adequate feedback is received, interviews with a second sample were not needed. The refined industry model is presented in Figure 3.

Following the DSRM (Peffers et al., 2007) we developed an industry modeling approach to support digital transformation efforts. Conducting a structured literature review is effective to reveal an

exhaustive list of potential model components. Subsequently, the identified components should be aligned with model frameworks. These steps generate an initial industry model artifact. Industry executives could then provide feedback to establish the validity and value of the model. This development and subsequent validation process (which we refer to as the SIMDP) answered the first research question: *How can business model components be specified using a convergent process?*

Next, the feasibility of the convergent business model development process was determined via the SIMDP phases: a) structured literature review, b) identifying model components from the literature, and c) and validation through practitioner interviews. After determining the value an industry model could create for the online learning industry, model components and alignment were derived by investigating academic literature. The initial online learning industry model was established through a model classification approach (Pateli & Giaglis, 2004), and interviewee feedback validated much of the preliminary model with recommendations for changes. These recommendations are included in the final model. Industry validation confirmed that the model would assist organizations in defining digital strategies and implementing digital transformation. This addresses our second research question: *How feasible is a convergent process for identifying business model components within a target industry?*

**Figure 3. Result of the structured industry model development process (SIMDP) for the online learning industry**




Note(s):
1) Blue boxes represent the model framework as derived from the Business Model Canvas.
2) White boxes represent the business model elements derived from the Business Model Canvas.
3) Orange boxes represent model components. Dark shading indicates a change from the initial Industry Model artifact.
4) Arrows indicate linkages evident in the industry context.

A validated industry model can help develop a successful business strategy since industry executives understood and agreed with the identified components. Industry models could help organizations better understand and align their business components with industry partners. Doing so leads toward mutually beneficial goals, innovation, and differentiation. This shared understanding would aid digital transformation efforts. This addresses our third research question: *Can industry models create a shared ontology among diverse organizations to assist digital transformation efforts?*

## Implications

The SIMDP supports organizations undergoing digital transformation using a novel convergent approach. Such transformation efforts often involve the development or redevelopment of business models to focus on digital-first strategies. Business models support transformation efforts by providing a beginning for the development of new business plans and sourcing resources, articulating components necessary to achieve innovative product or service strategies, and analyzing transformation decisions and their effects on competitive advantage (Foss & Saebi, 2017; Osterwalder et al., 2005; Venkatesh et al., 2019).

A purpose of business modeling is to facilitate the ideation of new business models (Morris et al., 2006). Organizations can develop sustainable competitive advantages through a shared ontology (Zott et al., 2011). For example, organizations and entrepreneurs can use the resulting industry model to seek new market niches and optimize revenue opportunities. Contrary to existing business modeling tools and approaches that focus on the business and present a divergent exploration of opportunity, this approach begins with the industry level to model an ecosystem of opportunities that includes external entities.

In addition to developing new business models, senior managers and administrators can apply the SIMDP to evaluate their respective business components within an appropriate framework. Innovators and developers can also find value in the SIMDP and its resulting industry models. Specifically, technology providers could develop processes and expert systems to guide business leaders through the SIMDP. Furthermore, such systems could help organizations ideate novel and innovative business models from the resulting ecosystem models. The complexity of the model components within their framework, along with their potential relationships, provides organizations an opportunity to develop systems that facilitate secure and compliant information exchange. Such information systems could allow specific components to become commodity services (e.g., online delivery through existing sharing economy enterprises). Others could become value-add services (e.g., linking to individual reputation service providers).

## Limitations

There are limitations to the proposed process. First, it is possible that the process did not elicit all relevant model components. There may be aspects of an industry model that are important but have been overlooked. However, as the literature review found the most relevant and widely used model components, this is unlikely to be. Second, model validation was conducted with ten industry experts to identify missing aspects. Based on both techniques, the researchers are confident that all essential components were included. Future researchers could propose additional guidelines to ensure exhaustive identification of model components. Next, the industry model artifact we developed is specific to the online learning industry. Creating an ontology for other industries may not be as effective. Future research should attempt to develop other industry models. This may help determine which industry factors influence the value of the SIMDP. Industry model artifacts should be shared through scientific literature or professional associations to enable model comparisons. Perhaps the industry model artifact's ultimate value is the non-biased presentation of an industry's relevant business components. Additionally, issues like representation, visualization tools, and knowledge on evaluation criteria for *ex-ante* and *ex-post* assessment must be substantiated – in response to the call from Pateli and Giaglis (2004). Finally, the process itself and its ability to support digital transformation was not evaluated.

Future research should examine the process in various organizational contexts, and in comparison, to other modeling approaches. Researchers could establish if convergent, divergent, or even mixed approaches are most effective at driving innovation and transformation.

## CONCLUSION

This study presents a well-defined, validated process for modeling industries. Furthermore, fundamental concepts of business model research were analyzed. While we selected the online learning industry as an illustrative context for the study, the development approach, resulting model, and validation procedure provide substantial value to individuals interested in developing industry models. Furthermore, the structured approach is feasible and presents value to industry leaders. Morris et al. (2006) suggest that a challenge of developing any model is that the model should apply to various firms yet be specific enough for use by individual firms. The SIMDP addressed this need by specifying industry model components and aligning the components with a relevant framework to ensure a shared ontology. Furthermore, the SIMDP incorporates academic and industry insight and works for an emergent and transformational industry (i.e., online learning). The SIMDP presents organizations with a validated tool to rapidly develop an industry model using empirical evidence and industry knowledge. Academia is in a unique position to facilitate the creation and adoption of industry-specific models through research and to teach the application of such processes in the classroom. Therefore, this approach is novel and contributes to both academia and practice.

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