Charting the Course: A Business Model Taxonomy for LMS

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Abstract: In the rapidly evolving landscape of online educational technology, Learning Management Systems (LMS) play a pivotal role in shaping modern learning paradigms. This paper introduces a taxonomy aimed at facilitating the nuanced configuration of business models tailored for LMS providers. Through a multi-step empirical approach, this taxonomy captures the intricate interplay of dimensions inherent to LMS ecosystems. Leveraging empirical insights and industry expertise, the taxonomy presents an innovative guideline that systematically delineates critical aspects such as value proposition differentiation, revenue generation mechanisms, user engagement strategies, and ecosystem collaboration. The taxonomy's development focuses on the rigorous empirical analysis, ensuring its relevance and applicability in real-world contexts. By offering LMS providers a structured roadmap for crafting

and adapting their business models, this research contributes to the advancement of educational technology entrepreneurship and aligns strategic pursuits with evolving educational needs.

Keywords: Learning Management Systems, Taxonomy, Business Models, Business Model Innovation, EdTech

1 Introduction

In the ever-changing landscape of education, the integration of technology has become imperative – no less corroborated by the pandemic-driven need for online services. One of the decisive factors facilitating this transformative journey are learning management systems (LMS). As online learning technologies for the creation and management of learning units, they facilitate learning outside the common classroom (Sabharwal *et al.*, 2018; Turnbull, Chugh and Kucj, 2020). Modern LMS go even beyond these features and include elements of gamification, agile learning paths, and collaboration, leading to a complex and diverse environment (Kattoua, Al-Lozi and Alrowwad, 2016). These platforms have become central in orchestrating modern learning paradigms by offering adaptive, interactive, and learner-centric educational experiences. Reflective of that is the steep increase of market volume for online learning services with a compound annual growth rate (CAGR) of 10% (2023 -2027) and an expected market size of 229 billion USD until 2027 (Statista-Market-Insights, 2023). In 2023, approximately 12% of employable Europeans participated in an educational or further training measure on average, representing an almost 3 percentage point increase over 2020 (Eurostat, 2022). Their potential exceeds the professional enterprise world to include academic institutions and individuals seeking upskilling as their target group. As this demand grows, so do the possibilities of their corresponding business models.

The role of business models in this context is pivotal. Serving as a blueprint for emerging or forward-thinking providers while referencing already established LMS organizations, business models can offer guidance in strengthening their added value within the educational technology ecosystem. However, navigating the vast possibilities of business model innovation without industry insight is challenging and leads to missed opportunities. Selecting the right tools is "just as important as the people applying them" when it comes to business model innovation (Garfield *et al.*, 2001). Ultimately, the question arises: What aspects currently define a LMS business model? A taxonomy can present valuable discernment and understanding about interdependencies while enabling business model innovation – simply by providing an overview. With the right value proposition portfolio, a delimitation from competitors can be initiated more easily.

The aim is to develop a taxonomy which supports LMS providers with a structured roadmap for configuring and evolving their business models, thereby contributing to the advancement of educational technology entrepreneurship. By conceptualizing a LMS business model through a taxonomy, LMS providers can select suitable aspects which address their requirements and have a proven track record of being applied throughout the industry. This ultimately results in more effective and adaptable learning solutions.

A taxonomy development method is applied by conducting various empirical iterations in the field of LMS (Nickerson, Varshney and Muntermann, 2013). Those

findings were combined with an additional empirical examination of practical business applications in the context of LMS to then derive the taxonomy accordingly.

This paper's contribution represents three interdependent purposes through the development of a taxonomy. First, the taxonomy gives a structured overview of the LMS providers' current business models. Second, this simultaneously describes an initial conceptualization of LMS and relevant dimensions for their business models. Third, it also provides useful guidance for enterprises to realign their initial business model.

In the following sections related work regarding business model innovation and current developments in the field of education technology are introduced. The taxonomy development method is then explained and applied to extensive empirical LMS business model research using an iterative approach. The resulting business model taxonomy for LMS is described comprehensively. Ultimately, we propose potential application designs and options before critically discussing the methodology and the taxonomy itself.

2 Related Work

Business Model Innovation

Besides designing new business models, organizations can also view them as a subject of innovation by evolving already existing business models (Mitchell and Coles, 2004). Business model innovation (BMI) is often described as a necessary skill to adapt to a continuously changing business environment (Teece, 2010) and to create a sustainable competitive advantage (Zott, Amit and Massa, 2011). Triggers for BMI can be new technology opportunities (Ancillai *et al.*, 2023), changing customer requirements, or the intrinsic need for operational improvements (Burmeister, Luettgens and Piller, 2015). Iterative changes can be regarded as an evolutionary alteration of an existing business model to secure an organization's economic survival. One explanation for BMI is the disadvantage of stagnation and, hence, the importance of its prevention. The disruptive modification of business models can open entirely new markets and customer groups (Mitchell and Coles, 2004). BMI can, however, also be achieved through incremental changes and benchmarking (Osterwalder and Pigneur, 2013). In any case, BMI ultimately leads to new concepts such as collaborative innovations or circular economies (Vaska *et al.*, 2021).

Developments in Education Technology

In consequence of the pandemic, innovations in the education industry surge, serving as a catalyst for sustainable transformation of the education and training sector (Jäger, Falk and Lenz, 2021). LMS as one manifestation of Education Technology (EdTech) can adapt their products and services and, hence, their business models quickly to shifts in the market or customer requirements. This is due to their value proposition's modular structure which needs to be adapted to the respective customers anyway. In EdTech, businesses integrate innovative teaching methods and learning solutions. While some barriers like concerns, IT budget constraints, and application comprehension have been addressed by contemporary EdTech efforts, persistent challenges, including data sovereignty, security, and data trust, remain unresolved in emerging EdTech experiences

(Renz and Hilbig, 2020). EdTech's disruptive potential is reshaping traditional educational institutions. These disruptive activities are not incremental changes but forge novel educational approaches, compelling traditional higher education institutions to embrace transformative shifts (Weller and Anderson, 2013; Renz, Krishnaraja and Gronau, 2020). With artificial intelligence playing a central role, it's notable that AI-based teaching and learning solutions have limited presence in the market. AI holds significant untapped potential, given the data-centric nature of the field (Hilbig, Renz and Schildhauer, 2019). While various industries utilize user data to innovate their business models, the education sector is still at the beginning of data integration (Renz, Krishnaraja and Gronau, 2020). This perspective raises questions about the extent to which data currently informs the business models of EdTech providers. Although EdTech is confronted with many opportunities and a strong demand, their business models seem to lack the momentum the industry itself faces.

3 Methodology

Taxonomy Development

To address the rapidly shifting market and establish guidance, this paper's theoretical objective is to create a meta-perspective on the field of LMS providers. We applied the method designed by Nickerson et al. (2013) to systematically develop a taxonomy for LMS business models. Taxonomies organize knowl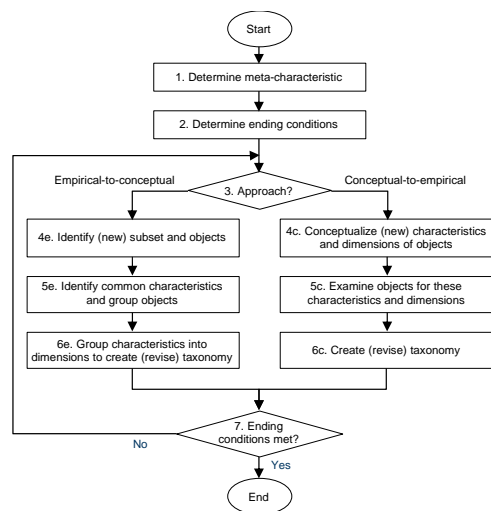edge in a concise and simple way by providing a hierarchical classification to retrieval information within a broader context and displaying relationships between characteristics (Glass and Vessey, 1995; McKnight and Chervany, 2001). The method itself follows a multi-step approach: 1) specify meta-characteristics; 2) determining stopping conditions; 3) selecting various empirical-to-conceptual or conceptual-to-empirical approaches; and 4) iteratively following this approach, until the stopping conditions are met.

Figure 1 Taxonomy development method by Nickerson et al.

Starting with determining a set of meta-characteristics, this step aims to prevent naïve empiricism by defining a basis along which all identified aspects can then be aligned (Aldenderfer, M., Blashfield, 1984). Since the taxonomy's expected use should be considered in defining meta-characteristics, it is crucial to include the expected users. Therefore, search for market research and literature was conducted to identify generic design dimensions by which LMS can be classified overarchingly. During further steps, these meta-characteristics may be subject to change. Based on the

results the five dimensions *technology*, *unique selling proposition (USP)*, *learning method*, *content*, and *target group* were identified. Then, we defined both objective and subjective ending conditions to terminate the iterative process. As for the objective ending conditions we applied all as defined by Nickerson et al.: 1) All objects are examined. 2) At least one object is classified under every characteristic of every dimension. 3) No new dimensions or characteristics were added in the last iteration. 4) No dimensions or characteristics were merged or split in the last iteration. 5) Every dimension, characteristic, and cell are unique. Additionally, the subjective conditions were also considered. The resulting taxonomy must be concise, robust, comprehensive, extendible, and explanatory (Nickerson, Varshney and Muntermann, 2013).

Iterative Approach

During the taxonomy development process, it can be distinguished between two different approaches. The empirical-to-conceptual approach starts with identifying a subset of objects and classifying them according to their characteristics. The conceptual-to-empirical approach, however, conceptualize dimensions without consulting objects and, moreover, relying on experience and an existing knowledge base (Nickerson, Varshney and Muntermann, 2013).

In total, we completed three independent iterations. The **first iteration** used a conceptual-to empirical approach where a survey was conducted in the environment of a German project circle that arose from a funding call around digital further education. By selecting this approach as a first iteration, the general distribution of aspects and their impact on the meta-characteristics could be assessed. There, experts in this field were asked 23 open-ended questions to verify the meta-characteristics and extend the LMS business model taxonomy to the best of their knowledge based on their experience. Six people responded back to us, which led to a taxonomy extension of 128 aspects over 13 dimensions and 10 subdimensions. When an aspect is named as a component of an LMS business model, this aspect is included in the taxonomy.

The **second iteration** was conducted as an empirical-to-conceptual approach. Here, we included use cases from one of the above-mentioned projects in which overall three LMS were applied. This gave us extensive qualitative insight and background knowledge into their underlying business models and their expectations for business model innovation. Due to multiple workshops with the LMS providers, these business models resulted in extensive validation of iteration step one. Those workshops were conducted from January 2022 to August 2023 and included several representatives from organizations surrounding the specific LMS. Ultimately, this step led to a taxonomy extension to 136 aspects over 13 dimensions and 10 subdimensions.

The **third iteration** also was an empirical-to-conceptual approach, where we conducted an extensive desk research by identifying a total of 786 individual LMS by consulting associations and knowledge carriers, as well as websites cataloging LMS providers in comprehensive records. Various documents, third-party information available online and the LMS websites were searched to obtain as much information relevant to describe a business model. This step led to a final taxonomy consisting of 184 aspects over 13 dimensions, 12 subdimensions, and 2 sub-subdimensions visualizing the taxonomy's hierarchical order.

At this point, the taxonomy included a considerable number of aspects. They themselves were concise (they did not include redundant aspects), robust (they provided

differentiation among each object), comprehensive (any now object can be classified), extendible (new dimensions may still be included if required), and explanatory (each object can be described uniquely through the taxonomy). The scope of aspects does, however, invite to entertain the thought of merging multiple aspects and dimensions. By conducting a fourth iteration, this will most certainly be inevitable. Hence, the decision was made to terminate the iterative process.
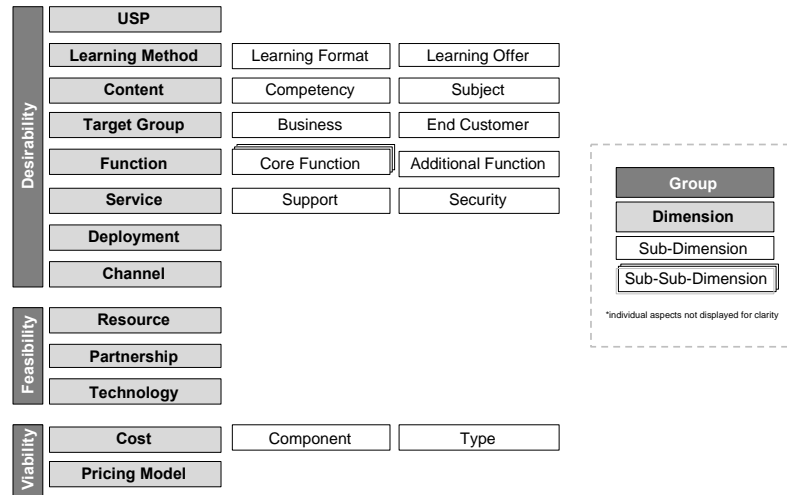

Figure 2 Taxonomy for LMS business models

4 Business Model Taxonomy for Learning Management Systems

The taxonomy on LMS business models represents the most distinguishing aspects between individual LMS providers and how they delimit their value creation process. It does not capture universal business operations. The 184 aspects are arranged hierarchically but omitted in Figure 2 for clarity. Those aspects on the taxonomy's lowest hierarchical level are unique. Some of the identified dimensions could be detailed during further the iterative steps. For the purpose of completeness, those aspects where subdivided, while other aspects of the same dimension did not. This was the case if an aspect was of high relevance to the differentiation between LMS such as core functions regarding the *authentication techniques* which needed to be further broken down, while related functions like *upload content* did not.

We grouped the 13 identified dimensions to encourage comprehensibility: desirability, feasibility, and viability. The hierarchy level format is explained in Figure 3.
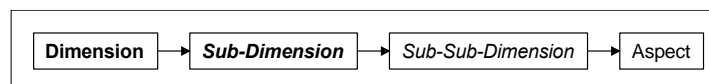

Figure 3 Taxonomy hierarchy level format

Desirability

This group of dimensions offers insight into who the customers are, how they can be reached, and why they want a certain product or service. **Unique selling propositions (USP)** describe therein how a LMS sets itself apart from the competition. Data security is a paramount consideration, addressing the security and privacy of user and learning data. Workplace learning addresses the availability of education services in professional environments, while also integrating state of the art technologies. Scalability ensures that the LMS can grow with user and customer needs. Personalization tailors learning paths and other LMS functions to individual users. Integrability relates to the system's compatibility with other tools and platforms. Sustainability highlights the long-term viability and the economic effects of the system. User-friendliness, as reflected in the GUI, is crucial for a positive user experience. Platform connectivity and compatibility support customer satisfaction through the possibility of linking additional systems. Adaptivity includes the fast reaction time of LMS providers to market changes. Availability and mobility cater to accessibility, and the system's design impacts its overall usability and visual appeal.

Within the dimension of **learning methods**, certain *learning formats* are overwhelmingly supported. Those are micro learning, learning nuggets, videos, blended learning, live events, presentations, and lessons on site. *Learning offers* for learning methods are highly individualized and can differ greatly between LMS. They augment the conventional formats or knowledge dissemination. Those offers are serious games, business games, virtual classrooms, web-based training, simulations, chatbots, wikis, podcasts, train the trainer, quizzes, tests, and protocols.

One of the most amendable dimensions is probably the **content** dimension. It comprises all processed learning information which is allocated to the users. In the context of organisational education, customer and product training can be supplied to employees. Simultaneously, mandatory instructions – for occupational safety for example – or soft skill training can be passed on to employees as well. Certain (technical) *competencies* can also be provided to specific employee groups such as trainings in the field of IT applications, business processes or digitalization, change management, data security regulations, compliance, AI, production, onboarding, or business administration. LMS can also provide general education in *subjects* such as math, history, culture, languages, social issues, economy, and healthcare.

LMS can also decide on the **target group** they want to target and commit to. Either they attract customers who are *businesses* wanting to offer their content to other organizations such as businesses, NGOs, universities, schools, or the public administrations, or to the *end consumer* such as apprentices, pupils, parents, teachers, trainees, or private individuals. A smaller amount of LMS open their platform to private individuals who offer their content to other private individuals – much like the idea behind Skillshare.

As part of the user journey, learners are confronted with a multitude of **functions** that are more common than others. *Core functions* are those most frequently found in modern LMS. Those include *content management* functions such as the creation, upload, and management of content or a content tracker to monitor the content history. By implementing a learning progress documentation, the data foundation is provided to conduct in-depth learning analyses and evaluation. This is strongly related to the deployment of an assignment engine and reporting structure. Additional functions are the

creation of categories and subcategories, certificates, due dates, and notifications. Entire subdimensions evolve around *user management* features including functions roles to self-registration and authentication methods such as active directories and registrations. ***Additional functions*** involve knowledge management and learner dashboards. Depending on the pricing structure there may be a shopping cart. Communication formats like forums, social media accessibility or mailing lists are also supported. This subdimension also includes a mobile version of the LMS, feedback functions, and favorite lists.

As for the **services** related to the core functions, LMS business models offer what would commonly be described as product-accompanying services. Besides *support* services like setup, maintenance, and an interface to third party providers such as mail clients, general services include test engines there are support structures (24/7 support, knowledge base, online communities) as well as *security* measures like antispam, antivirus, IP blockers, restricted registrations, or password suggestions.

Just as any other software product LMS can be **deployed** as a on-premise software solution, be obtained via the cloud, or used as either offline.

To get the product to their customers in the first place, LMS providers can chose between various **channels** to get in contact with potential users and their respective organizations. These options include mailing lists, intranet, social media, cross-selling, flyers, trade fairs, direct acquisition, and websites.

Feasibility

The second group of dimensions revolve around the internal condition for a LMS provider to create value and enable desirability. For this, **resources** are applied to facilitate the value creation process. Since LMS providers are generally software businesses, many of its resources address this need. Besides general personnel, know-how, and content a LMS must include specific key resources such as an IT infrastructure and technical specifications exceeding modern industry standards such as SCORM or xAPI.

As before mentioned, the key aspect for LMS is its content. Not every LMS creates its own content. Most actually only provide the infrastructure and let their customers upload content relevant to their respective target group. Those who do curate their own content acquire third party content delivery partnerships. Other forms of **partnerships** LMS providers form are for technologies, certificates, data, or sales.

Since the pandemic-driven success of LMS, they have to establish secure a competitive advantage over players in the offline market. One way to achieve this is by refining their product and service portfolio through **technologies**. Artificial intelligence is applied in various functions sch as adaptive learning paths, augmented and virtual reality, recommendation systems or nudging. Gamification is another example of an AI-powered function that can be integrated in form of leaderboards, levels, point systems, and rewards. LMS are interface-dependent systems that heavily rely on standards to deliver their value proposition.

Viability

Viability addresses the likelihood for sustainable economic success based on maintaining sufficient revenue streams higher than corporate expenses. For the **cost** structure there are

aspects which occur with a certain significance in LMS compared to other organizations. Assuredly, marketing and costs for technology integration is of high importance even to LMS. However, operational costs as in costs for development, support, maintenance, integration, and staff are in focus due to the online-service oriented nature of their business.

To offset corporate costs, a **pricing model** needs to be established addressing multiple preferences from the target group. First, there are multiple *components* that can be subject to being priced. A price can be demanded for the provision of (external) content or individual functions. The *types* of pricing depend on their suitability regarding the pricing subject. This may be a licensing model, subscriptions, sales, freemium, pay per use, or a free trial.

5 Application

The LMS business model taxonomy serves as a valuable tool for a broad spectrum of clients. LMS providers themselves, investors, and consultants alike can benefit by applying the taxonomy as an assessment framework for current business models. It may offer valuable insights into potential opportunities and new areas to explore not just for the organization itself but also as part of the product development or revenue diversification. Besides these direct impacts, the taxonomy may also influence market research and trend analyses by simply outlining aspects according to which the competition and other market participants differentiate themselves. By presenting LMS providers with a catalogue for potentially suitable aspects, incremental changes and disruptive ideas may be triggered. Hence, the LMS business model taxonomy can also be used as an access point for impactful business model innovation. As part of a holistic change management, all relevant stakeholders must be engaged and invited to work towards a clearly defined objective and give feedback continuously for the method to be most successful and sustainable (Doppler and Lauterburg, 2008). Any changes may meet less interorganizational resistance and improve the adoption rate of said changes. It is important for the participants to recognize that not all taxonomy aspects are applicable to every LMS. The selected aspects, hence, must be customized to their unique context.

One application scenario for the taxonomy can be a dynamic click-path as part of a central resource hub website to interactively configure a personalized LMS business model. Additionally, collaborative projects with LMS providers can be conducted that involve applying the taxonomy. These projects can serve as best practice examples where the standard operating procedure is refined.

Since the LMS industry is a highly volatile market, a crucial point is to provide continuous updates of the taxonomy itself and mirror new research findings to practitioners. By creating a centralized knowledge repository as part of the proposed website, practitioners can access and contribute to a wealth of documented information and best practices.

6 Discussion

In our research, we developed a taxonomy that comprehensively outlines the aspects of LMS business models by extracting implicit knowledge from practice and industry

examples. It can be applied as a tool to redefine LMS providers' business models and prepare them against competition. The final composition of aspects demonstrates the intrinsic and inherent focus on customer needs and how they translate to business requirements. Unlike other industries, LMS providers are confronted with rather few (sub-) dimensions but comparatively copious aspects. Unsurprisingly, most aspects revolve around the IT sector, since LMS are classified as software artifacts.

During the taxonomy development, some steps included minor challenges. As for the definition of meta-characteristics, we had to focus on identifying primarily business model-related aspects and not include redundant or unrelated factors, which permanently distort the taxonomy's design. Initially the first iteration was supposed to be a structured literature analysis. However, first search queries yielded insufficient scientific results to support an argumentation. Hence, the decision was made to rely on other data available online and abandon a strictly scientific analysis. Early on, the spotlight was on LMS-specific business model aspects. Part of the reasoning behind this decision was that holistic data on LMS was difficult to obtain. Most of the knowledge we'd like to deduce is implicit knowledge that is not available on corporate websites. Frankly, businesses are reluctant to disclose certain information since it represents a competitive advantage. This led to a lack of representative aspects reflecting general LMS industry areas and the taxonomy not being complete.

Other challenges faced concerned the interdependencies between individual aspects and their impact. Their impact and compound effects are not considered in an exclusively descriptive overview. This may lead to obstacles in practice. Interdependencies can, however, be considered by conducting a pattern analysis to identify underlying business model patterns. Thus, recommending closely related aspects for certain selected business model elements. Additionally, efforts to standardize the taxonomy can be explored enabling interoperability and a consistent classification of LMS business models. For this data analytics can be utilized to include feedback from practitioners and researchers to continuously evolve and refine the taxonomy based on experience.

Future research may also include the consideration of downstream effects along the value chain through the integration into learning analytics to provide insights into the effectiveness of different LMS business model configurations on learning success.

7 Conclusion

The demand for LMS grows. But operating in a soaring market without industry insight is demanding and can lead ineffective strategic alignment. Therefore, this contribution introduces a LMS business model taxonomy inviting incremental and disruptive business model innovation. It serves as a structured overview to realign and revise certain business areas or products and services. With this method, a LMS provider can delimit itself from competitors by identifying established and reliable aspects and incorporating them in their portfolio.

In total, we identified 184 aspects over 13 dimensions, 12 subdimensions, and 2 sub-subdimensions by applying a taxonomy development method. We extracted the relevant data throughout three iterative steps choosing between an empirical-to-conceptual and a conceptual-to-empirical approach each time. After the third iteration our predefined ending conditions took effect finalizing the taxonomy.

The taxonomy provides a structured overview of practice-oriented business model aspects and offers a deeper understanding of the underlying industry dynamics. It supports the initial conception of LMS business models and represents a potential course of action for business model innovation while inspiring the development of new features, services, and delivery methods, fostering healthy competition. LMS providers can align their business model strategy with the evolving educational needs of the digitalized post-pandemic world. By enabling LMS providers to better cater to learners' needs, we hope that the lasting impact on the LMS industry will involve a more engaging, personalized, and effective online learning experience and improved learning outcomes for users.

Since the relevance and applicability of this taxonomy in real-world contexts have been a primary focus throughout its development and is rooted in empirical analyses, it is designed to be a practical tool that LMS providers can implement to navigate the challenges and opportunities in the EdTech market. This taxonomy not only aids in understanding current LMS business models but also offers a framework for future adaptations. Adopting this taxonomy offers LMS providers a blueprint to redefine their business models, ensuring alignment with evolving market needs and encouraging innovation. LMS providers can enhance their competitiveness while realizing their specific requirements.

In the end, the taxonomy also represents a call to action for LMS providers to chart a course towards a future where business models and educational needs are harmoniously aligned, ultimately benefiting learners and educators alike.

Acknowledgement

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