The Digital Transformation of Enterprise Architecture on Culinary SMEs: A Case Study – Culinary SMEs in DKI Jakarta Province

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The free market in Indonesia has resulted in increasingly fierce competition in the business industry. This encourages business people, especially Small Medium Enterprises (SMEs), to carry out digital transformation. Transformation is a structural shift, which is gradual, comprehensive, and cannot be returned to its original form (irreversible). Digital transformation is characterised by the development of wide-area networks, shifts in ways of communication, and changes in people's lifestyles. According to Ministry of Communication and Informatics 2020 data, Indonesia ranks the 8th country with most internet users in Asia. The number of internet users in Indonesia reached 132.7 million with 51% penetration, and 106 million of them actively use social media, with a penetration of 40%. The above considerations suggest that digital transformation is beneficial and very much needs to be considered by SME actors. 59 million SMEs in Indonesia are not yet digital literate. Obstacles in the implementation of digital transformation are related to human factors, lack of adequate resources, lack of clear business strategies, and business processes that are not focussed on customer needs. Therefore, an Enterprise Architecture (EA) is needed to align business with Information Technology (IT) to maximise the contribution of company resources, IT investment and system development activities to achieve performance goals. Developing Enterprise Architecture at SMEs needs to be adopted, or an EA framework for enterprise architecture needs to be developed by the SMEs themselves. The method used by this analyst uses the Zachman Framework. Enterprise architecture identifies and defines common data types that support business functions that are

defined by business models. This EA design produces a model that can be used as a reference for culinary SMEs to achieve digital transformation.

Key words: *SMEs, Digital Transformation, Enterprise Architecture, Zachman Framework.*

Introduction

Nowadays, with the introduction of the free market in Indonesia, increasingly fierce competition in the business industry has resulted. This encourages businessmen, especially SMEs, to carry out digital transformation. Transformation is a structural shift, which is gradual, comprehensive, and cannot be returned to its original form. Digital, or more commonly called digitisation, is a form of change from analog mechanical and electronic technology to digital technology, where everything can be done through such sophisticated equipment to facilitate community affairs. Digital transformation is characterised by the development of area-wide networks, shifts in ways of communication, and changes in people's lifestyles. According to Ministry of Communication and Informatics 2020 data, the number eight ranked country for internet users in Asia is Indonesia, where the number of internet users reached 132.7 million with 51% penetration, and 106 million of them actively using social media, with a penetration of 40%. The above considerations confirms that digital transformation is beneficial and very much needs to be considered by SMES actors. As many as 59 million SMEs in Indonesia are not yet digital literate. Digital transformation is a change in all strategies for creating jobs and income, applying flexible management capital to business competition, quickly making changes, re-creating businesses to digitise operations and expand relationships supply chains, functional use of the internet in design, manufacturing, marketing and sales, which are presented in a database management model (Daniel, et al. 2018). The existence of digital transformation results in more efficient SME business operations, provides new business opportunities and generates greater profits for SMEs (Tyas, and Tarmuji, 2013).

However, the application of digital transformation is not easy. Obstacles in the implementation of digital transformation are related to human factors, lack of adequate resources, lack of clear business strategies, and business processes that are not focussed on customer needs. Therefore, an Enterprise Architecture is needed to align business with IT (Kotusev, et al, 2017) (Purchase, et al. 2011) (van der, et al. 2010). Enterprise Architecture is a management practice to maximise the contribution of company resources, IT investment and system development activities to achieve performance goals (Schilling, et al, 2019) (Slamento, et al, 2012) (Falahah and Rosmala, 2010).

In developing Enterprise Architecture at SMEs, it is necessary to adopt or develop an EA framework for enterprise architecture. There are various kinds of frameworks that can be utilised for developing enterprise architecture: here we utilise the Zachman Framework. Enterprise Architecture or enterprise scale architecture identifies and defines common data types that support business functions that are defined by business models (Slamento, et al, 2012), (Falahah and Rosmala, 2010). This EA design produces a business model that can be used as a culinary SMEs reference to achieve digital transformation.

With a good enterprise architecture design, it is hoped that harmony between information technology and business needs can be realised in order to run business processes in accordance with the goals and targets of SMEs.

Enterprise architecture describes a plan to develop a system or set of systems: logic organisation for key business processes and Information Technology (IT) capabilities that reflect the need for integration and standardisation of operating models. The key purpose of business architecture is to educate, direct and restrict organisational decisions, in particular when investing in IT (Safarina, et al. 2015), (Sudrajat, 2014).

Enterprise architecture is a method used to build an enterprise architecture. The definition of Enterprise Architecture (EA) includes the following: EA is a reflection of business logic and information systems to help businesses that emphasise how technology, people and business elements can be organised, integrated and IT strategies built to enhance business performance (Godinez, et al. 2010) (Garbarino-Alberti, 2013). EA is defined as a representation from a high-level perspective on a business process that occurs in enterprise and information technology systems and their relation to one another and is an extension of how processes and systems are shared between one part and another (Tamm, et al. 2013). EA is a practice in a field with the aim of improving the management and functions of complex companies and the application of information systems in the company (Lapalme, et al. 2015).

The Zachman Framework is an Enterprise Architecture framework that provides a way to formally define an enterprise. The Zachman Framework classifies descriptive representations of corporate information architecture into cells based on 6 focus columns and 6 perspective rows. The focus can be identified by questions namely; What, Where, When, Why, Who and How.

1. What (data): describes the unity that is considered important in business. These units are things whose information needs to be maintained.
2. How (function): defines functions and activities. Input and output are also considered in this column.
3. Where (network): shows the geographical location and the relationship between activities

within the organisation, including the geographical location of the main business.
4. Who (human): represents humans in companies and metrics to measure their efficiency and capabilities.
5. When (time): represents time and shows work criteria. This column is useful for designing schedules and architectural processes.
6. Why (motivation): explains the motivation of the organisation and its work. This is where we see the goals, objectives, business plans, knowledge architecture, reasoning and decision making in organisations (Kurniawan, 2016).

The perspective describes the Zachman Framework viewpoint or level of abstraction of knowledge generated by a cell. Each line reflects the perspective below (Sardi and Surendro, 2016), (Supardi, 2016):

1. The Perspective Planner: establish context, background, and goals.
2. The Owner Perspective: establish the conceptual model of the enterprise.
3. The Designer Perspective: sets the information system model as well as bridging what the owner wants and what can be realised technically and physically.
4. The Builder Perspective: establish the technical and physical design used in overseeing technical and physical implementation.
5. The Implementer Perspective: establish roles and references for those responsible for building information systems.
6. The Participant Perspective (Operation Classes): represents the perspective of the user and the actual manifestation of the results of implementation.

Figure 1. The Zachman Enterprise Framework 2012 version (Zachman, 2012)

The Value Chain Model (Value Chain) function of the value chain is to describe how to see a business as a chain of activities that can change inputs into outputs so that it has value for customers. Value Chain provides a framework for identifying and inventorying areas of business function, namely by grouping functional areas into (Sutarmin, 2012):

1. Primary Activities, as follows:
a. Inbound Logistics Activities related to reception, storage, input to products, such as: material handling, warehousing, inventory control, transportation scheduling, and returns to suppliers.
b. Operations Activities related to turning raw materials into finished goods, such as: packaging, installation, maintenance, retesting, operation of facilities, and maintenance of equipment.
c. Outbound Logistics Activities related to the physical collection, storage and distribution of products to consumers, such as: warehousing of finished goods, material handling, operation of goods delivery vehicles, order processing, and scheduling.
d. Marketing and Sales Activities related to providing facilities that can be used by buyers to buy a product, such as: through advertising, promotion, salespeople, determining the amount of quota, distributor relationships, and pricing.
e. Service Activities related to the provision of services to increase or maintain the value of products, such as: installation, repair, training, and product adjustment.
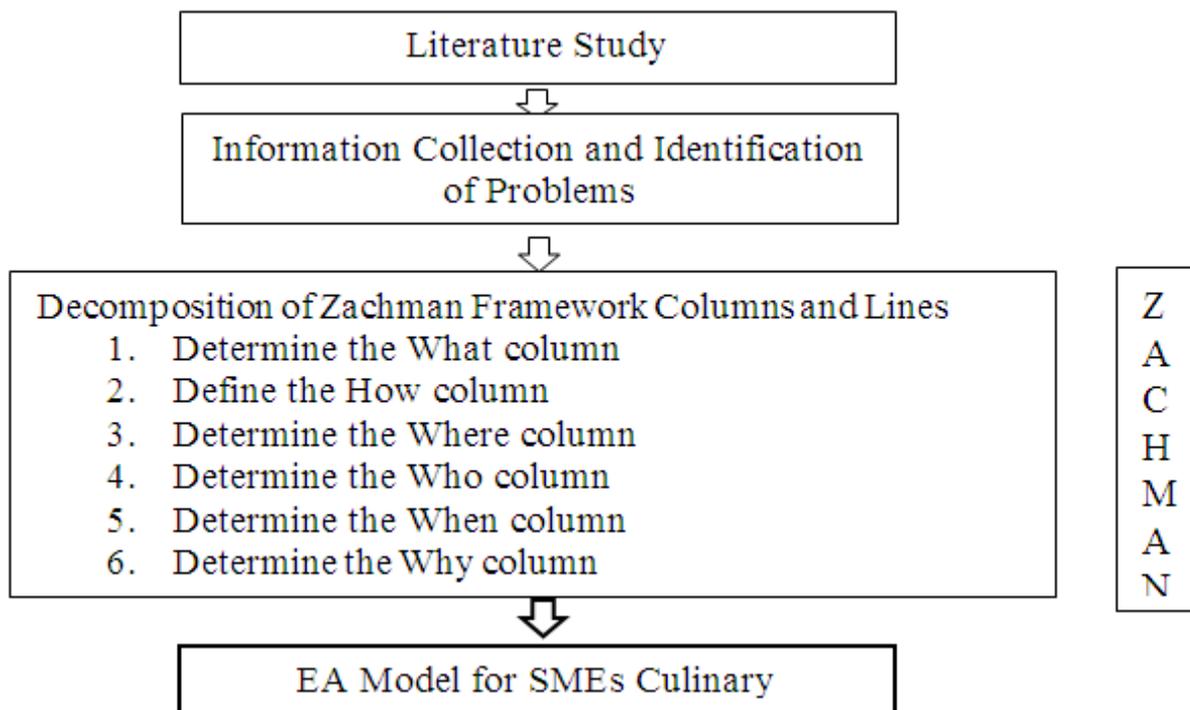
2. Support activities
Supporting activities which are supporting activities of primary activities consist of:
a. Procurement refers to the buying role of the inputs used in the supply chain of the business, not to the purchased inputs themselves, but rather to the inputs comprising raw materials, suppliers and other supporting resources and properties such as machinery, office equipment and buildings.
b. Technology Development consists of a number of broadly grouped activities ranging from the technology used in preparing documents and distributing finished goods to the technology inherent in the products produced.
c. Human Resource Management consists of activities that include: recruitment, hiring, training, workforce development, and compensation for all types of personnel. Resource management influences competitive advantage through its role in determining employee skills, motivation, and the costs of hiring and training.
d. Firm Infrastructure consists of a number of activities which include: general management, planning, finance, accounting, law, government affairs, and quality management. Infrastructure is different from other supporting activities that support the whole value chain and not individual activities.

Methodology of Research

In this study, the methods are: 1. Literature search. The research is conducted by drawing up relevant libraries with regard to the research topic sought; 2. Direct observations made on site (observations) to see firsthand the processes that occur during production that are related to the materials needed in research as well as documentation; 3. System design analysis. This method is to use the Zachman framework which will be described in each column consisting of What, How, Where, Who, When and Why, and each row consists of a planner, owner, designer, builder, programmer, and user; and 4. Zachman Matrix of Digital Transformation on Culinary SMEs. For more details, the research flow is presented as in Figure 2.

Figure 2. Research Flow

Result and Discussion

Value Chain Analysis is carried out to map the entire work process carried out in the organisation into two categories of activities, namely the main activities and supporting activities. Refer to the organisational document that discusses the duties and functions of each work unit for the assessment carried out on the work process carried out in each Culinary SME work unit. The aim is to improve the value chain where companies can increase value for prices or for additional costs. Value added can make companies more competitive. The business process contained in Figure 3. as illustrated using Value Chain is a business process that exists at this time to define the functions that exist in each business process that will be modelled in

the form of business processes. These are divided between primary activities: Material and equipment division, Product Production, Product Distribution, Product Marketing and Product Feedback. While support activities for primary activities are: finance, recruiting, training and payroll, web management, marketplace, social media and goods procurement. These activities will become profits for SMEs.

Figure 3. Value Chain in Culinary SMEs
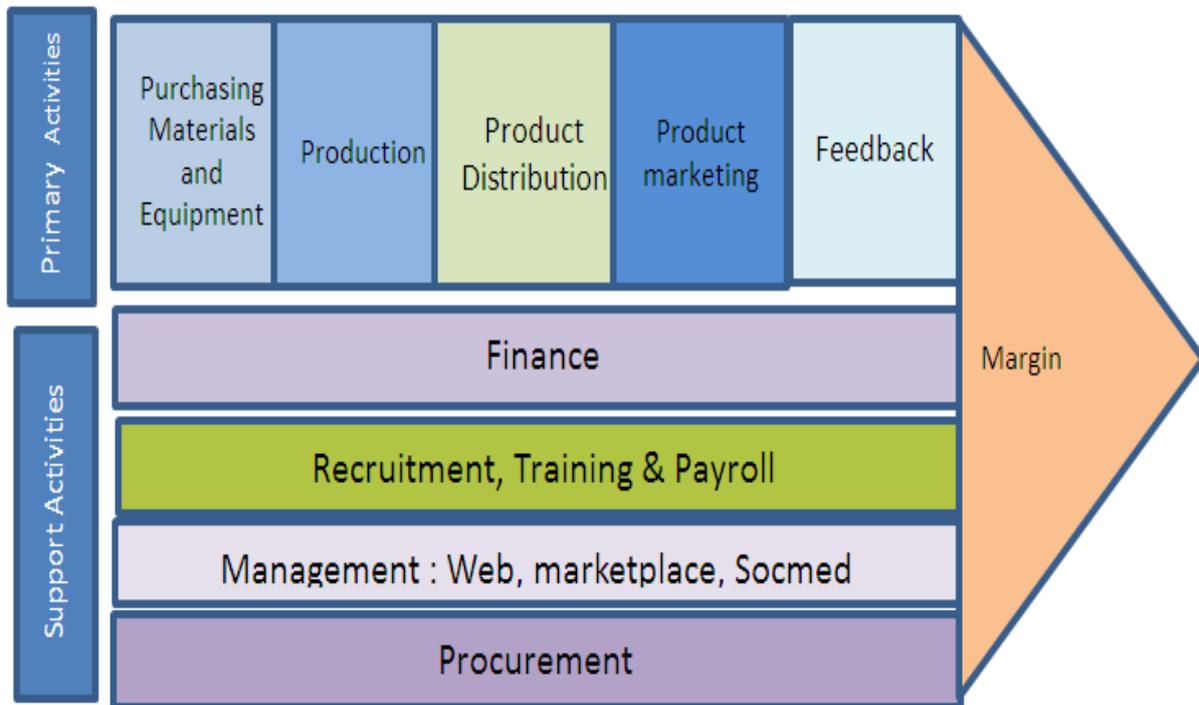
Culinary SME Stakeholders

When observing, the researchers found that the culinary SMEs already existed in the form of a community incorporated in an independent organisation in the culinary field – an Indonesian culinary forum. Related to the formulation of the problem, SMEs are indicated to have a strong desire to implement Communication Information Technology in their business strategies. Some ICT applications that exist to date are the application of social media, business sites and Android-based mobile apps. However, the application of ICT at this time has not yet emerged with integrity and interdependence among stakeholders in culinary SMEs in the province of Jakarta, so that information becomes isolated and incomplete. There are several key parties involved as illustrated in Figure 4 below:

Figure 4. Culinary SMEs Stakeholders

Implementation of the Zachman Framework

The design of the model will be arranged sequentially based on the abstraction framework from Zachman, namely: What, How, Where, Who, When, and Why. Then each perspective is determined based on:

a. Executive Management Overview, seen from the Planner that produces Objective/Scope. This architecture defines a functional global business model and various external organisational requirements. Describes the vision, mission, context, boundaries, and system architecture in the Culinary SMEs.

b. Senior Management, seen from the Owner who is the person most responsible for the organisation, where in this study is the person responsible for the culinary. From this point of view, the owner will present a proposed system and how the system can be used in a still simple picture. The owner only sees how the system will work, who are the people needed to build the system and what is the purpose of the system.

c. Business System Architect, seen from the Designer who produces the Information System Model. More detailed logic models that contain the needs and design boundaries of the system are represented by architects as designers.

d. Information System Architect, seen from the Builder who produces the Technology Model. A physical model that optimises design for specific needs within specific technological constraints, people, costs and timeframe specified by the engineer as the builder.

e. System Analyst / Programmer, seen from the Programmer who produces the Detailed System definition. Specific technology, about how to build and develop code programming or coding: there are some restrictions or rules that are important to note based on the perspective of the subcontractor.

f. User and Service Provider, seen from the User that produces the Implemented and Operating System. Various kinds of guidelines for users to function in the system, perform operations management, and evaluate the system in Culinary SMEs

Table 1: Zachman Matrix of Digital Transformation on Culinary SMEs

Abstract/Perspective	Data (*What*) (thing)	Function (*How*) process	Network (*Where*) Location	People (*Who*) People	Time (*When*) Time	Motivation (*Why*) Motivation
Scope (contextual) *Planner*	Data: partners, activities, resources, Cost structure, Revenue, Value propositions, Channels, Community, and Customers.	Business Process: inbound, Production and outbound	The application system will be centred in DKI Jakarta province	Farmers, Suppliers, Culinary Entrepreneurs, Government, Local / International Organisations, Communities, Activists, Researchers, Seller / Entrepreneur, System Operator: Manager / Admin system.	Event Local, Event International, routine activities	Culinary SMEs' vision and mission
Business model (conceptual) *Owner*	Flowmap and Usecase system	Physical data Flow, activity diagram	the general network configuration of the designed application system for Culinary SMEs	system administrators, web masters, web developers, operator	Time Schedule for Information Technology project development	Reasons for procuring Information Technology
System model (logical) *Designer*	ER Diagram	Sequence, Detail Usercase	Proposed Network Design	Application Interface Manual Design	Detailed System Model Design Schedule	Rules in designing the Model
Technology model (physical) *Builder*	Relations between tables	process of application usage	Location and Technology used	Application interface overview	detailed application design schedule	Rules in making the design
Detail representations (out-of-context) *Subcontractor*	Entity Table Creation Algorithm	Culinary Business Process Algorithm	Configuration of network router settings	Application Access configuration algorithm for each User	Detailed coding process schedule required	Rules in coding process
Functioning enterprise	Example Data: partners, activities, Key resources, Cost structure, Revenue streams, Value propositions, Channels,	Examples of transaction data that occur in the system	Network Infrastructure required	Users of the information system	Time schedule for the process of design and implementation	SOP for the use of Information Technology applications

	Community, and Customers.					

Zachman Framework classified based on Table 1.
What

Planner: Explain the importance of key points in building Culinary SMEs. Nine keys in running the Culinary business model, namely: (1) Key partners, (2) Key activities, (3) Key resources, (4) Cost structure, (5) Revenue streams, (6) Value propositions, (7) Channels, (8) Community, and (9) Customers.

Owner: Describes data from interrelated entity relationships within the Culinary SMES, in the form of ERD.

Designer: Design a data relation model which illustrates the relationship between key data needed in doing business in Culinary SMEs.

Builder: Information systems architect maps data architecture to develop information systems needed for Culinary SMEs.

Programmer: Defines data that will be designed for SMEs based on architectural data that has been created in the Builder's perspective.

User: Describes what kind of data should be managed by application users through the design of user display forms in interacting for data management.

How

Planner: Describes the process of doing business, namely: Inbound: raw materials from suppliers or directly from farmers.

Production: the main actors in the production are Culinary SMEs, in the process there is support from organisations (international / local), government, communities, NGOs, and researchers. Outbound: SMES products, marketing them personally, via entrepreneurs or during exhibition events.

Owner: International organisations such as the World Culinary Organisation in collaboration with the Ministry of Cooperatives and SMEs as well as the Ministry of Trade and Industry compile programs and momentum; ministries through local governments implement programs, funding, momentum and coaching. Local governments also foster communities so that these communities foster and accommodate SMEs. Local and international funding agencies usually have funding programs, generally providing grants both directly and through NGOs to provide loans to SMEs. Research and development are carried out by institutions, activists or culinary

activists. Whereas the product sellers (traders) and exporters generally absorb the products and market them both locally and for export, regularly.

Designer: Design a flowchart of physical data and how the process is run.

Builder: Designing an application system architecture that is suitable for SMEs.

Where

Planner: The application system will be centred in DKI Jakarta province, even though it is accessed globally. Its users, namely: (1) the main target of application users is the specific province of DKI Jakarta and generally Indonesia, including; SME actors, government, organisations (communities, NGOs, relations) suppliers, entrepreneurs, researchers, culinary activists, farmers and plantations. (2) As for organisations, customers (entrepreneurs/ consumers), funding, and events covering Indonesia and the World/ International.

Owner: Describes the general network configuration of the designed application system.

Designer: describes the data flow in operating information systems, application architecture and compilation of data needed in the UMKM application system.

Builder: Describes the system architecture and technology in the network used in SME system applications

Programmer: Performs configurations on the operating system, network system, apache, system applications, firewalls, domain name server management, hosting panels, databases, and others that are in accordance with the application system design for SMEs.

User: Describes the hardware, software and service requirements for network infrastructure and SMES application systems.

Who

Planner: The parties that have a key role in current SMEs based on Figure 3 are: (1) Inbound – Farmers, Suppliers; (2) Production – Culinary Entrepreneurs; (3) Supporters – Government, Local / International Organisations, Communities, Activists, Researchers; (4) Outbound – Seller / Entrepreneur; (5) System Operator – Manager / Admin system.

Owner: describes the workflow model and the people involved in it directly, in this case the workflow is divided according to what is described by the planner, namely: a. Farmers (active farmers, passive farmers, independent, groups), suppliers of raw materials (distributors, collectors) b. businessmen, c. Government (central government / ministries, provincial governments, local governments), Local / International Organisations (NGOs, World culinary organisations), Communities (Nusantara Food Communities, Spice Communities, Indonesian Food Bloggers, Jalan Sutera), Activists, Researchers (educational institutions, non-educational institutions) d. Seller / Entrepreneur (local sellers, international sellers, exporters) e. System manager (system administrators, web masters, web developers).

Designer: Describes the architecture face to face with the user.

Builder: Describes the architecture of the presentation of the users.

Programmer: describes the application system security architecture.
User: describes the needs of the application system user in operating it.

When

Planner: Generally, this business is carried out continuously, while for the big momentum in the marketing framework there are several momentum events, namely: (1) Local; national exhibition, ministry exhibition, provincial exhibition, regional government exhibition, creative industry exhibition, (2) International; art and culture exhibitions, international culinary congresses, (3) Application system; used for routine.
Owner: Development of the model through schedules tailored to the target
Designer: Describes the time schedule for designing a system in Culinary SMEs.
Builder: Describes the time schedule for designing the system in detail.
Programmer: describes the time schedule to design an application system conversion.
User: Training for key users is done within a period of three days after completion of system testing. During the training a training module was made and the "HELP" feature was provided in the SME system application.

Why

Planner: about the vision and mission in general Culinary SMEs.
Vision "Culinary Business with the Widest Distribution Network that Prioritises Quality and Service to Customers and Business Partners".
Mission: Expanding Distribution Networks throughout Indonesia and Abroad.

1. Improve Production Standards and Product Quality.
2. Providing the Best Services supported by Trained and Professional Workers.
3. Using an Effective and Efficient Information Technology System.
4. Improving Employee Welfare and Business Partner Satisfaction.

Owner: Describes business goals and plans for SMEs.
Designer: Describes the business rules model for SMEs.
Builder: Describes the design model of business rules.
Programmer: Describes the specification of the rules for the program logic.
User: This column describes the user procedures and rules imposed by the system and must be carried out by system users when they use the SMEs system application.

Conclusion

There are many entities that are involved, interconnected and mutual in the culinary sector SMEs in the DKI Jakarta province. Research shows several main problems including certainty of the availability of raw materials, some product quality that does not yet have the Indonesian National Standard, communication and collaboration, funding, and marketing. The Zachman framework provides a complete picture of what kind of information and communication technology is appropriate and needed by the SMEs. The framework was built into the basic architecture in making information systems, so for any application developer for a culinary business, the description of the architecture in this study can be a reference.

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