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Service Value Co-Creation in Research & Innovation Practices in Higher Education Institutions in Malaysia

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Abstract

In today's knowledge-based society, research and innovations play a critical role in social and economic transformation. However, the higher education institutions (HEIs), which are the main hubs for knowledge generation, usually produce basic research, yet innovations are mainly carried out by the industry. Therefore, this study explores the idea of value co-creation between HEIs and the Industry for purposes of increasing the volume and value of research. In this paper we propose a conceptual framework for service systems' architecture which draws from the service dominant logic and work systems theories. The paper is conceptual however, it is hoped that if implemented can provide the participating entities with a platform to integrate and share resources for each ones benefit.

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*Keywords:*Even Drive Architecture; Service Oriented Architecture; Service Systems; Value Co-Creation

1. Introduction

In today's knowledge-based society science and technology seem to be the main drivers for social and economic development [1, 2]. Unfortunately, available evidence suggests that Malaysia is lagging behind the developed countries in most areas relating to research and innovation [2-6], yet it has a vision of becoming a developed country by 2020. Some of these areas include; high technology exports, patent applications filed, trademark applications filed, scientific and technical journal articles published, among others. As a result, Malaysia is classified as

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scientifically lagging in ranking made by Rand corporation's composite index, which measures a nations technological capacity. These include; *scientifically lagging, scientifically developing, scientifically proficient and scientifically advanced* [3-5]. Nevertheless, Malaysia has made substantial progress in developing the science and technology infrastructure, and as a result a UNDP Technology Achievement Index classifies Malaysia as a *potential leader* in categories which include; *marginalized, dynamic adopters, potential leaders, and leaders* [3]. The table below shows Malaysia performance in the some areas of Science and Technology as compared to selected countries from the 22 classified as scientifically advanced.

Table 1: Performance in science and technology by selected countries: Source (2012 World Development Indicators, World Bank).

Country	Patent Application filed (2010)	Trademark Applications filed (2010)	High Technology Exports ($millions -2010)	Scientific & technical Journal Article Published (2009)
Malaysia	6,463	26,370	59,332	1,351
China	391,177	1,057,480	406,090	74,019
Japan	344,598	124,726	122,047	49,627
South Korea	170,101	129,486	92,856	22,271
United States	490,226	281,867	145,498	208,601

Based on the above evidence there is a need to explore ways of increasing on both the volume and value of research in Malaysia. This forms the motivation for investigating the concept of value co-creation, since the current business trends demand for more "*connectivity*" and "*interactivity"* between the producers and customers [7]. The outcomes of this study are organized as follows; introduction, value co-creation, theoretical foundations, discussions, the proposed framework and conclusion.

2. Value Co-Creation

Value co-creation is a concept on how products or services are collaboratively created between producers, customers and other stakeholders [8, 9]. The process involves accessing resources by one entity, adapting them, integrating and applying them in a particular context other than in exchange [7]. Value co-creation offers several advantages including understanding customer needs, and continuous inter-organization cooperation resulting into competitive advantage and superior firm performance [10-12]. Service systems are the main vehicles for value co-creation [7]. Unfortunately there are insufficient studies on value co-creation and service systems especially in the field of information systems. Information systems researchers instead have been discussing e-service(s) [13], which is an aggregation of all services that can be delivered by information technology from the service providers to the service costumers [13]. But the current e-service implementation focuses on the goods dominant logic, and addresses services (the intangible products), other than service which is the application of knowledge and skills by one party for the benefit of another[8]. Yet the latter has become the new locus of value creation [3, 7], thus the need to investigate these phenomena further.

2.1. Service Systems

Service systems defines the way organizations arrange and manage their technology, people and business processes in order to support service-to-service exchange or value co-creation [7]. A Service system is connected by value prepositions, and is the basic unit of analysis in service-to-service exchange [7]. It can make value propositions based on its capabilities and competences which other systems can accept, integrate and adapt within their context [7]. The terms service systems and service innovations are often used interchangeably. However, service innovation is about creating or improving service systems [7, 14], and service science is the main discipline combining these two phenomena [15]. Meanwhile, there has been less research conducted on service systems especially in higher education institutions. One of the studies in this area only looked at the economic contribution of universities to their environment [16]. The other considered how service systems can be used by students who study abroad to interact with their mentors [17]. The rest [7, 9, 18-24] discussed service systems in other areas other than on higher education institutions. Hence, this study investigates how this concept applies to higher education

institutions and the industry since all businesses are service business [8]. The underlying theories for this study are discussed in the following section.

3. Theoretical Foundations

This study draws from two theories; the service dominant logic (SDL), and the work systems theory. A work system is a sociotechnical systems or automated systems *in which people and automated agents conduct work using various resources to create products or services for customers* [25]. The proposed framework was developed based on the nine elements of the work system framework. However, since the work system framework was developed based on the goods dominant logic, we try to map each of the nine elements to the ten fundamental premises of the service dominant logic. Service Dominant Logic (SDL) is a marketing theory which proposes an alternative approach to value creation based on value-in-use as opposed to the traditional value-in-exchange [7, 10]. In SDL value creation is about integration of resource and sharing of competences between parties for their mutual benefit, thus it is a combined effort of many parties, but should be customer-driven [7, 10, 18]. In the following section we discuss how value co-creation can be actualised in research and innovations.

4. Discussions and Recommendations

Research and innovations involve a lot of resources, work and risks and require specialized skills and competences. Meanwhile higher education institutions and the industry have abundant resources, which they can integrate and share, but they continue to operate in isolation [3]. The few integration initiatives so far are portal-based which cannot support end-to-end business processes; even departments at institutional level operate in functional silos [26]. Thus we recommend an enterprise architecture that brings together higher education institutions and the industry on a common platform to share resources and competences in a service-oriented approach. Enterprise architecture is the *organizing logic for an organization's IT infrastructure and business process capabilities to address a firm's need for IT and business process integration and standardization* [27, 28]. The following table shows a mapping of the proposed elements to those of the adopted theories.

Table 2: Mapping of the Elements of Work System Framework, Service Dominant Logic & the Proposed Framework

Work System Theory [GDL]	Service Dominant Logic	Proposed Framework
Processes & Activities	Service [FP1, FP2, FP3, FP4]	Service(s) Landscape
Participants	Actors [FP6, FP7, FP9,]	Internal Users Platform/External collaborators
Information	Resources [FP1, FP9]	Information Management
Technology	Resource Integrators [FP3, FP9]	Technology Architecture
Customers	Customer [FP6, FP8, FP10]	Internal & External Customers
Products/Services	Service/Value prepositions [FP1, FP5]	Service(s) Platform
Environment	Actors [FP9]	Governance/Business Process Management
Infrastructure	Resource Integrators [FP3, FP9,]	Collaborators Service Systems
Strategies	Actors/Value prepositions [FP7, FP9]	Governance/Internal & External Events/BPM

5. The Proposed framework

The above elements formed the basis for the development of the following framework. Each of the above elements is described in details in the following sections.

5.1. Business Process Management & Information Management

SDL, treats information is an operand resource on which operant resources act upon to create value. On the other hand, every work system should be able to input, process and output information, which usually involves many activities and processes [25]. Thus based on the above, for the case this study we propose the following processes to be exposed as sharable service; *skills and talent management, knowledge management, library resources*

management, customer relationship management, financial management, intellectual property management, and security & legal issues management among others. Furthermore, for effective management of these business processes, we propose a combination of three management tools i.e.; Business Process Management, Lean and Six sigma. Business Process Management (BPM) is a management style that aims at aligning an enterprise's business process with the needs of the customers. BPM addresses issues relating to business goals, business rules, and business strategy [29]. While, Lean is a management approach used to eliminate wastage, whereby anything that does not add value to the process, product, or service is treated as wastage and thus eliminated [30, 31]. And Six sigma is the management approach for process improvement and quality assurance [32].These three put together can provide a holistic approach for effectively management these processes [32].

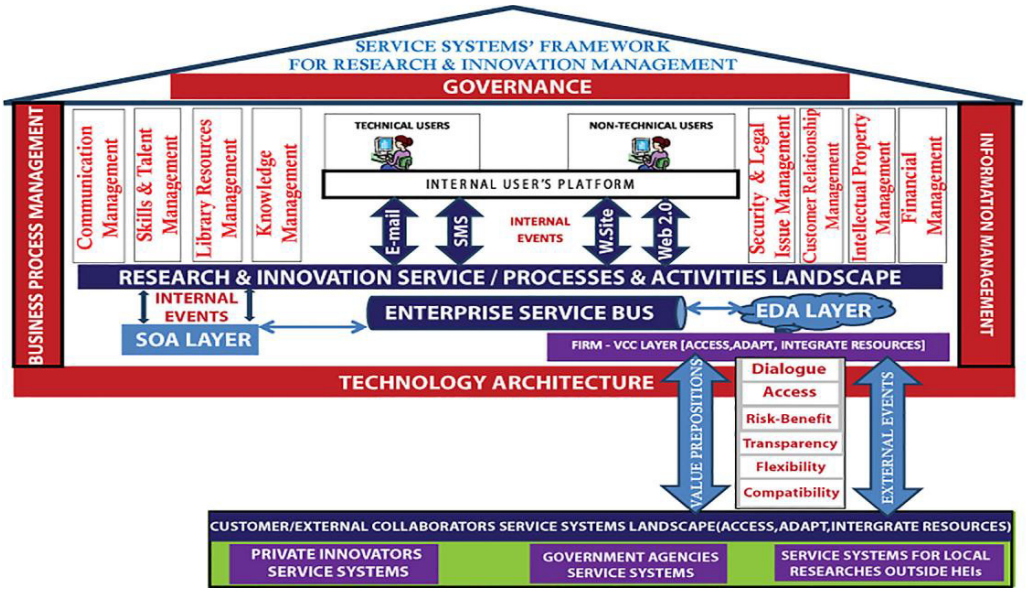

Fig. 1: The Proposed enterprise architecture based on SOA & EDA

5.2. Information Technology Architecture & Governance

Technology refers to the automated agents used in running business processes and in integration of resources. For the case of the technology architecture we propose; Service-Oriented Architecture (SOA), and Event Driven Architecture (EDA), interconnected through an Enterprise Service Bus (ESB). SOA is an innovative approach to enterprise application integration which provides a means of reusing existing services and integration of loosely coupled systems [33, 34]. SOA provides a way of breaking away from traditional silos, by exposing all functionalities as a set of sharable service(s) [35, 36]. In the context of this paper, SOA is to handle the internal business process because SOA uses a command-and-control approach. However, since SOA is based on a passive, request-and-reply style of data exchange, it may not be ideal for the impulsive nature of external events [37]. Hence we suggest that SOA should be complimented with EDA to handle the external events. EDA can support publish-and-subscribe as opposed to SOA's request-and-reply pattern or command-and-control structure [38]. This makes EDA the ideal option for managing business-to-business (B2B) integration scenarios which demand for extremely, loosely coupled components [38]. Thus, as the synchronous SOA controls the internal business processes, the asynchronous EDA will be handling the external federated events [39]. ESB can be used to interconnect SOA with EDA to provide a communication link through which service(s) or events can travel across disparate applications. ESB can support SOA's one-to-one exchange as well as EDA's many-to-many data exchange [40]. Governance is about people and leadership, policy formulation, organisation culture, which could be relevant to the effective performance and management of the service system.

5.3. Service Value Co-Creation

The value co-creation layer draws from the DART (Dialogue, Access, Risk analysis, Transparency) model which describes the interaction between service providers and customers. The original DART model includes four elements i.e.; dialog, access, risk-assessment, and transparency [9]. Dialog means continuous communication between the firm and customers to facilitate cross-fertilisation of ideas. Access, implies that customers should be allowed direct access to the relevant information to enable them make informed decisions. Risk represents the fact that all risks involved in the transactions from either side should be disclosed and assessed to avoid misunderstandings. Lastly, transparency means that transactions must be transparent. However, the original DART model was only limited to business-to-customer (B2C) transactions [12]. But since the proposed framework focus mainly on business-to-business (B2B) transactions, we decided to adopt a revised model proposed by [12]. This model extends the original DART by introducing two variable i.e. flexibility and compatibility; to make a firm adopt more easily to business, environment and technological changes [12]. Participating entities can make value prepositions at this layer which can be accepted by the other parties, adapted, integrated and applied in their own context [7].

6. Conclusion

This study has dealt with the concept of service and value co-creation. Drawing from the concept of value-in-use rooted in the Service Dominant Logic, we propose a service-oriented architecture for service systems–in research and innovation undertakings in higher education institutions. This framework addresses both internal perspectives and the global perspectives (B2B). The framework demonstrates how services systems can be configured and managed to support value co-creation between researchers, innovator/inventors, and other stakeholders. It draws from the SDL which suggests that value is determined through integration and use of operant resources. However, this paper is conceptual, but it is hoped that if implemented it can help in integration of research-related resources from all higher education institutions in Malaysia, and the industry. These resources can then be accesses simultaneously and adapted by each of the participating service system, to co-create value in research undertaking. This will help in strengthening the capacity of knowledge generation and linking of this knowledge to development goals. Benefits to be derived include; business process improvement, elimination of wastage, high productivity, increased revenue. Others include; enhancing business efficiency and effectiveness and customer satisfaction. Future studies should consider investigating the implementation part, and developing a service maturity measurement tool for this kind of arrangement.

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