

Motivational Antecedents that Influenced a Higher Education Institution in the Philippines to Adopt Enterprise Architecture

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Abstract—Technology is a recent prodigy in people's everyday life that has taken off. It infiltrated almost every aspect of one's lives, changing how people work, how people learn and how people perceive things. Academic Institutions, just like other organizations, have deeply modified its strategies to integrate technology into the institutional vision and corporate strategy that has never been greater. Information and Communications Technology (ICT) continues to be recognized as a major factor in organizations realizing its aims and objectives. Consequently, ICT has an important role in the mobilization of an academic institution's strategy to support the delivery of operational, strategic or transformational objectives. This ICT strategy should align the institution with the radical changes of the ICT world through the use of Enterprise Architecture (EA). Hence, EA's objective is to optimize the islands of legacy processes to be integrated that is receptive to change and supportive of the delivery of the strategy. In this paper, the focus is to explore the motivational antecedents during the adoption of EA in a Higher Education Institution in the Philippines for its ICT strategic plan. The seven antecedents (viewpoint, stakeholders, human traits, vision, revolutionary innovation, techniques and change components) provide understanding into EA adoption and the antecedents that influences the process of EA adoption.

Keywords—Enterprise architecture, adoption, antecedents, higher education institution.

I. INTRODUCTION

TECHNOLOGY counts more when it is directly applied to the delivery of a business outcome [1]. EA provides an architectural description or modeling of an enterprise and can be used as a management framework. EA can then be the process of translating business strategy into enterprise change by 4Ds. Defining (goals, strategies, principles, etc.), discovering (current processes, IT portfolio), developing (target processes, infrastructure assessments), and delivering, for enabling the institution's evolution to the desired future state.

Established from past statistics and future predictions, EA surprisingly benefits organizations with pitching the right capabilities (tools, processes, and people). Academic Institutions should transform and manage to survive to trends in order to establish an efficient and sustainable environment to fulfill its strategic goals, just like any other businesses. Part of the higher education's strategic planning process, EA helps to construct a framework of the overall business and IT

objectives for long-term strategies. It becomes much faster and easier to align capabilities throughout the academic institution and fortify technology-enabled solutions that are focused on transforming the teaching and learning experiences.

This paper strives to explore the question: What are the integral factors that influenced and motivated an academic institution to implement EA? Based on a qualitative research of a Higher Education Institution, the findings contribute to literature by identifying the antecedents during the adoption of EA in the Philippines context. Moreover, the study associated the antecedents with the Chocolate Model of Change [2] since EA adoption belongs to a transformation that will adopt change.

In Section II, existing literatures were used to provide existing EA adoption factors in different sectors. In Section III, research methodology and data collection process are discussed. Moreover, the identified antecedents with PHEI Thematic map and the Chocolate Model of Change Venn diagram are presented in Section IV. This paper concludes with a summary of the findings on the factors of EA adoption in the Philippine context, recommendation for further research and implications.

II. RELATED WORK

The environment of enterprises seems to change quicker than ever before [3]. According to [4], a winning enterprise is defined by its ability to differentiate and satisfy customers while performing at competitive cost levels. However, there is no "one size fits all" technique that is acceptable to support all kinds of change.

EA appeared to be the process that can "steer the ship of the enterprise through both quiet and turbulent waters, charting a course from its current location to a future location in a safe and streamlines way" [5]. According to [6], architecture is: "The fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution". Table I illustrates a synthesis matrix in EA adoption literature. The results covered key factors that are relatively associated with each other and that integrate the dimensions of people, processes, and technology. Reference [7] identified the relative importance of cognitive, normative, and regulative factors in the process of EA adoption in different phases and how the said factors change over time. For [8], EA should be reinforced at the management level, and communicates through the organization in order to reduce

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resistance and increase acceptance for the implementation to become successful. Reference [9] concluded three factors that drive EA development. organizational factors were constructed the greatest influence on the architectural

development process, personal factors on the other hand were labeled as very relevant to crucial factor, while technical factors were just seen to have a minimal importance in the development of EA.

TABLE I
EA ADOPTION SYNTHESIS MATRIX

Institutional Perspectives on the Process of EA Adoption, 2019		Implementation of EA for Government Organizations, 2017	Benefits and Factors Driving EA Development in a Large South African Utility Company, 2010
Perceived Benefits		Number of reduced processes, Stakeholder satisfaction	Manageable environment, Enables business and IT alignment, Integration of old and new systems, Allows for flexibility and responsiveness to change, Better decision making on system choices and adoption, Better risk identification and management
Challenges		Acceptance Resistance	
Factors Influencing	Cognitive Pressure, Normative Pressure, Regulative Pressure	EA education and knowledge dissemination to staff, Management good vision in IT and EA, Stakeholders and Management support, ROI to measure implementation success	Organizational Factors, Human or Personal Factors, Technical Factors

There is just a number of EA related enquiries in the Philippine context. [10] recommended TOGAF as a framework with explicit focus on Architecture Development Method (ADM) for the long-term ICT strategy of De La Salle Philippines (DLSP), while EA for Department of Health (DOH) in the Republic of the Philippines enables standards-based and interoperable health information system and e-Health solutions, adopted from the World Health Organization (WHO) EA Cycle [11]. Subsequently, the aforementioned researches, not in any way, comprehended the factors that influence the adoption. For this reason, the study desires to look at the antecedents or the factors that influenced the adoption of an HEI in the Philippine context. Furthermore, the researcher will try to evaluate similarities and differences between the factors from the literature and the factors that will be derived from this study, not to mention additional new factors that can contribute to the body of knowledge.

III. RESEARCH METHOD

The study focuses on the factors influencing HEI in the Philippines to adopt EA into its long-term ICT strategy. The researcher managed to employ a qualitative method, generally to understand the factors that motivated DLSU to adopt EA. The approach was complemented with an exploratory research design that attempted to explore the story on how the organization thought about EA that will give an impact to its adoption.

The researcher employed a face-to-face semi-structured interview with an open-ended question to individuals who are associated with EA projects. The interviewees were entirely from the academic institution domain, with a minimal to substantial knowledge in EA and are acquainted to a project related to EA. The researcher was able to interview 6 respondents that provided a concrete data as a key in intensifying value to the research. The interviews were recorded, and transcribed. Filipino contexts were translated in English to generate concepts. Interviews were requested through email and formal letters. Hence, consent forms were dispensed before conducting the semi-structured interview. The consent form is composed of the purpose of the interview,

where is it going to employ, the request of name inclusion, and the permission to record the discussion for data transcription and decomposition.

IV. RESULTS AND DISCUSSION

Thematic analysis was applied to identify possible factors, challenges, and benefits from the interviews [12]. The approach of the researcher is an inductive reasoning that is to focus on the data convened from the interviews and not to stretch to a greater extent. Moreover, transcripts were imported to ATLAS.ti as the QDA-software for detailed analysis.

The research involved four face-to-face semi structured interviews and lasted an average of 41 minutes or 23-57 minutes per person with an administration (Project Owner), management (Project Executive, three Project Managers with Technical skills), and technical (one Tech Support) perspectives, and two structured interviews through email from a technical perspective. Interviews were then transcribed verbatim. The research explored the factors that influenced and motivated the academic institution to adopt EA. Hence, the analysis was stimulated by the research questions.

Table II shows the varying codes within the respected themes or the antecedents, while Fig. 1 emphasizes the Philippine Higher Education Institution (PHEI) Thematic map with the seven motivational antecedents that were derived from the interviews of an administration, management, and technical perspectives of the team players and members of an EA driven project, which comprises of subthemes and its relationship to other concepts.

The Seven Motivational Antecedents of DLSU:

- 1) *Viewpoints*, the qualities that effect an individual and influences its decision-making capability.
- 2) *Stakeholders* are the members of the organization that has an interest or contribution to the success of a project or any member of the organization that can be generally affected.
- 3) *Human Traits* are the characteristics of a person that plays a part in a specific project.
- 4) *Revolutionary Innovation*, the activities that meets the

- needs of the future. This is more of the visionary foresight.
- 5) *Techniques* consist of the proposed structures in attaining the future state.
- 6) *Change Components* are the basic factors (human and processes) for adopting.
- 7) *Vision* is the future state of the project from the holistic perspective of the fusion of the 6 motivational antecedents.

TABLE II (A)
CODES EXTRACTED FROM INTERVIEWS

Themes	Viewpoint	Stakeholders	Human Traits	Techniques
Sub-themes	Starting Ground			Proposed Structure
Codes	Beliefs, Interests, Influences, Ideas, interpretation, Knowledge, Knowledge by practice, Perspectives	Adapters, Higher boards, People in general, Team members, Workforce	Accountability, Authority, Awareness, Confidence, Certainty, Decisiveness, Faith, Familiarity, Fear, Inspiration, Integrity, Passion, Positivity, Skills, Trust	Architecture, Guiding Framework, EA as guide, Instrument, Methodology, Policy, Principle, Standards

TABLE II (B)
CODES EXTRACTED FROM INTERVIEWS

Themes	Revolutionary Innovation	Change Components	Vision
Sub-themes	a. Understanding between People (Communication), b. Seeking Value (Assessment), c. Supplying the Need (Service), d. Satisfying the Need (Transformation), e. Linking the Processes (Integration)	Adopting Basic Factors	Institution Expectation
Codes	a. Getting in touch, Sentiments, should have buy-ins, No one left behind, Sympathy b. Analysis, Discussion. Clear Presentations, Assessment, Deep Understanding, Evaluation c. Better customer service, Solution, Social Impact, Support d. Adoption, Digital Transformation, Cure, Change, Discover, Enhancement, Governance, Improvement, Innovation, New Idea, Strategy Planning, Maturity e. Addressing gaps, Automation, Alignment, Central document, Connection, remove duplication and fragmented systems, Holistic, Real time documentation and updating, System continuity	Challenging, Laborious, shift in JD, Costly, Learning Process, On-going journey, People as the key, Resistance to change, ROI, Risks, Time consuming, Role of stakeholder, Stakeholder Involvement	Consistency, Integration, Forecasting, Convenience, Lifelong learning, Relevance, Seamless, Streamlined, Sustainable, Systematic

The researcher wants to accentuate the 3 main factors derived from the research, the Viewpoint, Vision and Change Components. Viewpoints are the starting ground and that is related to the Vision and Change Components. Values, Norms and Beliefs are enclosed in the viewpoint. The different perspectives of a person can positively or negatively contribute to the performance. Hence, knowledge and ideas are valuable because every person value a match between mind and world which is important in everyday life.

On the institution's side, the viewpoint is also the stepping stone of the stakeholders (Adapters and Agents) to accept and carry out the change. It contributes in exploring new innovative ways of transforming the academic institution and making it relevant for the next years. While on the other note, characteristics of a person also play an important function throughout the process since the way people manage themselves is a central part of being a leader or a follower. Good character is important for success in life, because it determines how well a person can achieve the goals, whether others want to deal with a person, and how well a person fit in groups.

As mentioned, stakeholder's viewpoints are associated with vision due to the beliefs and knowledge that a person established through practice and experiences. Vision in the research context is about the expectations of the academic institution from EA work like consistency, sustainable and a lifelong learning purpose. The vision is constructed by a revolutionary innovation that meets the needs, most importantly in the future which are composed of *harmonizing or the linking of siloed processes in business and IT*

perspective, satisfying the need of the institution through innovative strategy planning with governance until after coda, supplying the need to a better customer service and support, seek value by assessment, evaluations, discussions and deeper understanding of the context before execution, and an adequate communication between people to encompass the principle of "No one gets left behind." (P1 on RQ7)

To further fulfill the architecture, techniques manifests the proposed building blocks of the architecture blueprint which include the frameworks, methodologies, standards, policies and guiding principles in leading the way to a structured process.

Lastly, in every organization transformation, positive and negative factors come to light. Change components in this research were sliced into two, human and process factors. Human factors embodied the basic factors for adoption like resistance to change, it is challenging, and it is a learning process. While process factors are expressed by time, cost and risks. Thus, change components, especially the human factors boil down to the viewpoints and human traits of the adopters and agents.

The project team, from the Project Owner, Project Executive to its Project Managers and staff were vastly clear and consistent on the subject of EA role in the Academic Institution's plan. The respondents have the vision of a streamlined, sustainable and systematic process through the guiding framework of EA and other methodologies that can transform and enhance the institution to have a better long-term strategy plan.

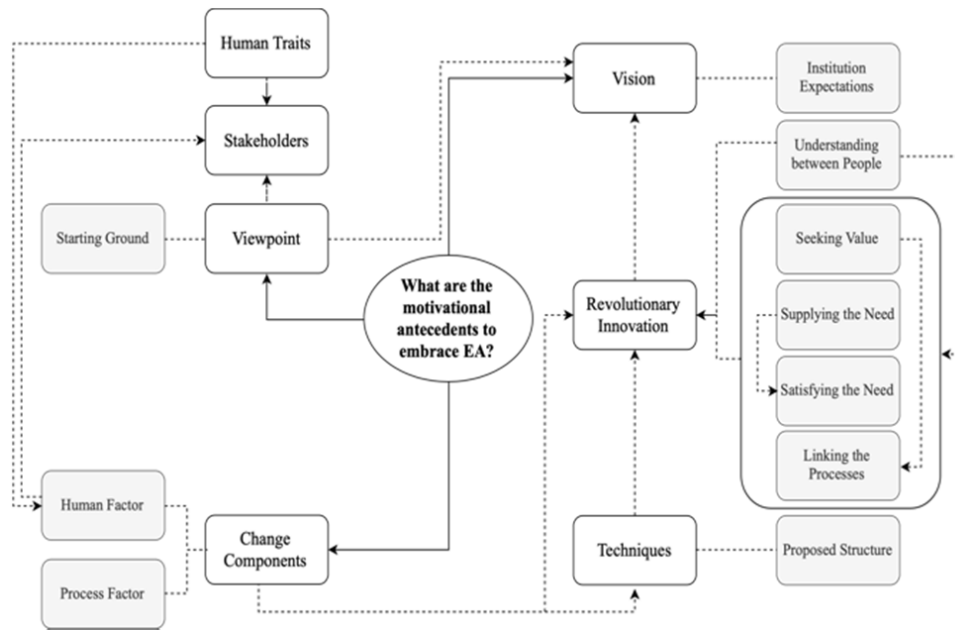


Fig. 1 Philippine Higher Education Institution (PHEI) thematic map

“EA is important as a tool, that we use. People are very important in carrying that for moving forward because we would like, or I would like to believe, that with the adoption of EA, five or ten years down the road, we are not anymore part of the team, ERP is finished and we are now in different roads, the people will take over and continue with we are hoping that that is something that we can turn over. Sometimes we have the culture of new appointment, new people, new everything. So, we, I, believe in standing in the shoulders of people you follow, so stand in the shoulders, so you can take a look at where you are, so you can take advantage.” (P1 on RQ9)

“For now, there are still islands of systems since we are still on the implementation phase. But we aim to slowly remove it. We aim to integrate and unify. And that is BITUIN stands for, Banner Initiative to Transform, Unify, Integrate and Navigate. It was coined by Sinag Solutions. EA is guiding us to have standards because EA is holistic. It looks not juts into processes, not just the systems, but policies and standards and guidelines. And we are working on the manuals that are not being strictly implemented. We are working on it, but that is also our aim. Is to reflect to the system what is in the manual, because we are going to have tastings.” (P3 on RQ6)

The perception is a holistic transformation, not only focused on the Information Technology side, but to innovate along its business, data, application, and technology processes through EA work and governance.

“So, for me it's as with all the EA presentations it's about alignment to strategic goals, objectives of organizations, IT-related investments can be aligned and will have a purpose for optimizing investments. So, there. EA would also have guidance on what projects to initiate,

when to start-off, to prioritize and to have proper timing of when to activate a new project. So, there.” (P2 on RQ11)

“Enterprise architecture for me is looking at the entire ecosystem and the connections and integrations between each part of the ecosystem. What are components that were defined that are in that ecosystem. What is the relationship of those to each other, how they flow? So, we're looking at business, the applications that run, the technology that supports it and the people. So, it's looking at everything.” (P3 on RQ1)

With this visionary foresight, siloed processes with islands of data will be automated and integrated to slowly diminish duplication, process variance and fragmented systems due to a need-driven request from different offices that were not properly evaluated, but depending on the need and cost-efficiency, therefore, can provide better customer service and support.

“Maybe, the current pain points of the university, islands of systems that are not integrated, no centralized source of data. If the admin asked for data, people can't give immediately since there are a lot of sources and consolidation is needed, and there will be a margin of error since processes are slow.” (P4 on RQ9)

“Most "connectivity" jobs are done manually. Some jobs are scheduled, but these could not be monitored as often as they should be. System documentation are not up-to-date. Staff are loaded with work, that they cannot devote enough time for documentation.” (P5 on RQ7)

“Conduct Systems Investigation with the user to fully determine their requirements. Do feasibility study based on the information gathered.” (P6 on RQ6 – this is about the new process of requests)

In order to accomplish and realize the vision, members of

the institution are substantial. Team members should seek understanding and compassion to make sure that upon the adoption and implementation of the EA work, no people should be left behind. On the other side, the change adapters should trust the team and cooperate to greater embrace the change.

“Buy-in of course, is always there are other perspectives and other beliefs out there how to accomplish certain things. (Values, Norms) That’s virtually the challenges we see. The community will resist change too because change is something you also need to manage. But I think moving forward also is I think we need to now draft a road map, to make sure that our EA work will follow a continuous path of improvement and enhancement. (Time as a challenge) Of course, we always need everything yesterday, and

transformations are very difficult to do with people and time is always not your best friend. Especially when you’ll talk to people who will be affected by change by job. The people who are going to be affected are also a little bit anxious.” (P1 on RQ7)

“It’s complex. It’s a lot of moving parts, it’s a lot of people, especially the people dimension that change management, changing organization structures, competencies and skill sets. That’s why human factors are very important.” (P2 on RQ7).

A Venn diagram (see Fig. 2) was used to illustrate the relationship among the Chocolate Model of Change Dimensions, the motivational antecedents of the research and the factors of adoption from the other related literature. Therefore, the model can positively support the change in the academic institution since it supports all of the factors risen.

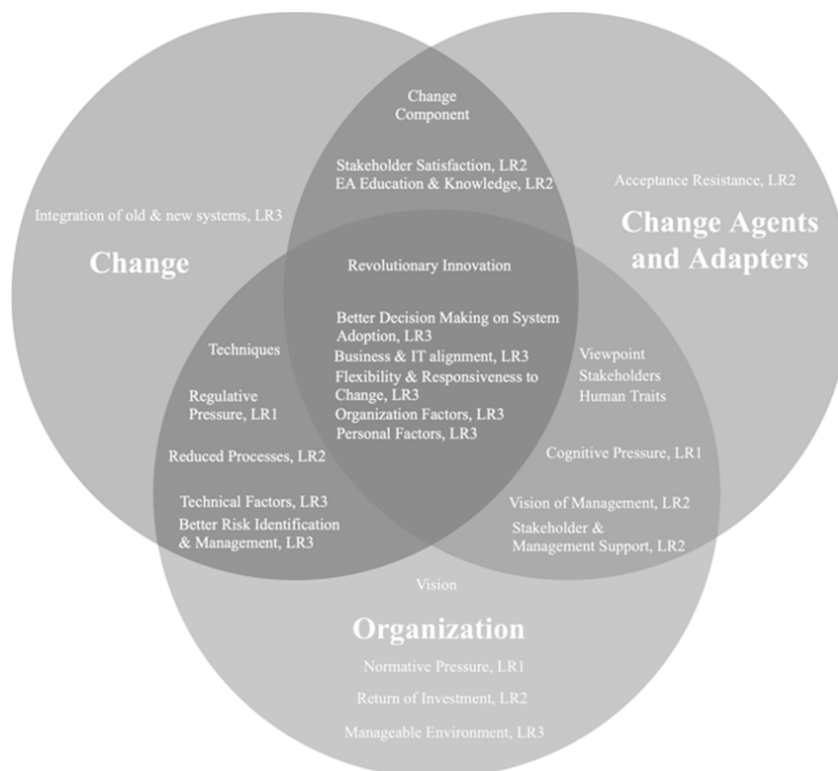


Fig. 2 The chocolate model of change dimensions with motivational antecedents

On the other side of the coin, regarding the related review of literature, there is a 63.16% significance of the motivational antecedents from the reviewed literature with the results of the study. Moreover, the enquiry was able to conclude additional distinctive antecedents for adoption which are the Human Traits or the characteristics of a person that can directly affect in adoption, the Revolutionary Innovation with the activities that meet the needs of the future, and the techniques that consist of methodologies, frameworks, policies and standards to be the guide throughout the EA work.

V. CONCLUSION

This paper seeks to enhance the knowledge regarding the factors of EA adoption in the Philippine context of Higher Education Institution by developing a PHEI thematic map that embodies the relationship between the antecedents and sub themes. It presented the 7 motivational antecedents, focusing on the 3 main factors derived from the research, namely, the Viewpoint, Vision and Change Components. Viewpoints are the starting ground which is related to the Vision and Change Components. It is also the stepping stone of the stakeholders to accept and carry out the change. Stakeholder’s viewpoints are associated with vision due to the beliefs and knowledge

that a person has established through practice and experiences. Vision in the research context is about the expectations of the academic institution from EA work like consistency, sustainable and a lifelong learning purpose. Techniques manifest the proposed building blocks of the architecture blueprint. Moreover, organization transformation has positive and negative factors come to. Change components in this research were sliced into two – human and process factors. Thus, change components, especially the human factors boil down to the viewpoints and human traits of the adopters and agents.

This research seeks to broaden the factors that influenced the adoption of EA by developing a thematic analysis map that contains concepts for analyzing EA work. Through the results of the enquiry, the researcher contributes to the body of knowledge of EA to the Academic Institutions in the Philippine context since there were just a few enquiries about EA in the Philippines. The study revealed the importance of human aspect that serves as the bedrock in aligning the vision of the project through revolutionary innovations for the success of EA adoption. Based from the results, an organization can make use of the identified factors as its fundamental components when doing EA work. Most of the research about EA adoption talks about EA as challenging due to human factors and methodologies, this enquiry now can give the EA adopters an overview of the factors that they can look at and therefore, strengthen, in order to prevent or deal with the forthcoming challenges. By this, the enquiry aims to spread the word to organizations who are looking at EA to consider the factors that significantly support the transformation. Since organizations already have a bird's eye view of the seven motivational antecedents that contributed to the adoption of EA in a Philippine context, the focal point now is to strengthen the said antecedents to boost the success of transformation. Overall, the study provides a foundation for understanding the adoption of organization-wide transformation.

Future research on social structures could further uncover supplementary factors by examining a wide range of organization in different fields and areas where EA has been adopted as a strategy. Hence, the researcher hopes to have more in-depth research on the human factor side during the adoption of EA, since people play a major role in a specific project, associated with the 5 Stages of Grief of the Chocolate Model of Change to realize the most perplexing stage of grief in which adopters tend to experience a plateau. No matter how good the transformation is, people are likely to resist change. But even when people do not openly resist, people may subtly or unintentionally resist. In parallel to the human factors that can efficiently manage change in order to get adopters to accept transformation, future research should supply the necessary approaches to counterpart the causes on why adapters resist EA transformation. In this way, the enquiry will give assistance to the organization and the change agents on the approach to bring into play when resorted to human resistance during the EA adoption.

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