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Lecturer Sociometric Badge as Digital Platform in Indonesia Higher Education Institutions From Organizational Effectiveness Perspective

This paper objective is to explain conceptually about the idea to use sociometric badge for lecturer generally in Indonesia higher education institution linked with organizational effectiveness perspective. Indonesian higher education institutions faced the globalization competition, therefore it would be challenge to check and improve Indonesian lecturer quality. Descriptive method used in this paper is based on linked secondary data (research journals). Based on Tri Dharma higher education in Indonesia, lecturers as knowledge worker have three main roles (as educator, researcher and community server). Every lecturer's roles have different interactions with different parties (internally and externally). These lecturer's three main roles is associated with the sociometric badge features which designed to collect face to face interactions data. This paper is unique because it links between the role-based lecturer face to face interactions, sociometric badge features and higher education institution from organizational effectiveness. Lecturer sociometric badge has the potential to collect important behavior data related to the interaction based Tridharma activity such as collaboration, leadership, communication style, conflict management, team work, role play. Furthermore, this paper has the potential to be a scientific basis for the empirical research on the detail activity analysis based on tridharma lecturers roles to known the Indonesian lecturer behavior face to face interactions pattern.

Keywords: Digital, Platform, Sociometric, Badge, Higher Education, Organization, Effectiveness, Interactions, Lecturer

1. INTRODUCTION

Higher education institution has its purpose. Theoretically organization is a part of the institution^{1,2}. Organization defined as social unity (entity) that consciously coordinated, with a limitation that can be identified, which works on the basis of continuously relative to fulfill a common goal and or group of goal^{3,4}. Indonesian higher education institutions divided into four categories: Academy (a 3 year professional diploma granting institution); Polytechnic (a 3 year professional diploma granting institution, usually in engineering, agriculture, or business); Sekolah Tinggi, a single faculty institution granting degrees up to S3, or doctoral level); University, a multiple faculty institution granting degrees up to S3 level⁵.

Organizational effectiveness may be typified as being mutable (composed of different criteria at different life stages), comprehensive (including a multiplicity of dimensions), divergent (relating to different constituencies), transpositive (altering relevant criteria when different levels of analysis are used), and complex (having nonparsimonious relationships among dimensions)⁶. Social scientists have always been interested in enhancing organizational effectiveness and individual well-being in the workplace⁷.

Studies on standards, indicators, criteria, dimensions the effectiveness of a university very rarely examined^{7,8}. A study in the context of higher education in Hong Kong says that there are four indicators of the effectiveness of a university⁹. The four indicators are: 1) Productivity-efficiency (The rational goal model); 2) Cohesion (The Human relation model); 3) Information management-communication (The internal process model); 4) Planning-goal setting (The rational goal model). Those indicators associated with competing values above approach^{10,11}.

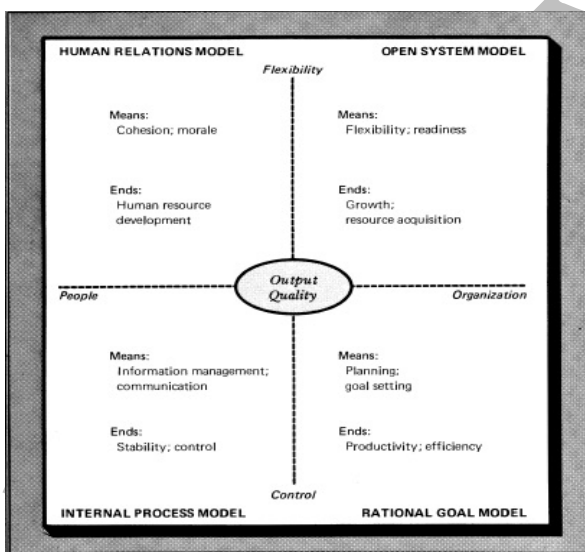


Fig.1. The Competing Value Approach¹⁰

Another research by Cameron^{6,12} and Smart et.al¹³ concluded that the criteria for the effectiveness of the university are:

- 1) Student centred: a) Student education satisfaction,

- b) Student academic development, c) Student career development, d) Student personal development.

- 2) Employee oriented: a) Faculty and administration satisfaction employment, b) Professional development, c) Quality of the faculty
- 3) Systemic effectiveness: a) System openness and community interaction, b) Ability to acquire resources, c) Organizational health
- 4) Clan/adhocracy organizational culture
- 5) Rational/collegial decision processes

Globalization has important impact to Indonesia higher education institution from competition perspective. Indonesia became part of the target market from several countries including Australia, New Zealand, the USA and Canada¹⁴. Global higher education is produced and consumed within a world-wide university hierarchy in which inequality between research universities, and between nations – and the often unidirectional flows of people, capital and knowledge associated with those inequalities – are necessary to global competition¹⁵.

Table 3. Segmentation of global competition in higher education

| | |
|--|--|
| Segment 1 World market of elite universities | The American doctoral sector and the high prestige universities in UK. Prestige not profit-driven. Prestige rests on research reputation and global power of degree |
| Segment 2 Exporting national research universities | Research universities in the UK, Canada, Australia, Europe, Japan. Prestige-driven at national level but often run foreign degrees as a profit-making business |
| Segment 3 Teaching-focused export institutions | Lesser status institutions in the export nations, operating commercially in the global market, catering to a lower cost/ lower quality echelon of foreign education. |
| Segment 4 Nationally-bound research universities | Prestige providers within a single nation, normally research intensive universities. Nationally competitive with Segment 2 (but not 1), minor cross-border role |
| Segment 5 Lesser status national/local institutions | Confined to national competition and local demand. No cross-border role. The largest group of institutions, especially in importing nations |

Fig 2. Segmentation of global competition in higher education¹⁵

From figure 2 can be seen that it is likely the majority of Indonesian position of higher education institutions that are in segments 4 and 5, only a few which may exist in segment 3. These conditions shall be responded seriously to continuously improve Indonesian higher education institutions quality gradually and also fast.

2. AUTOMATION AND KNOWLEDGE WORKERS

Technical developments in computer hardware and software now make it possible to introduce automation into virtually all aspects of human-machine systems¹⁶. Automation appears to contribute to a general shift in the work force from more specialized to less specialized occupations¹⁷. If it is associated with the concept of balance in the organization between flexibility and control, the automation will likely to play a role in the control section, the control is associated with stability. In the study of the organization turned out to be a balance between flexibility and control gained from competing value approach as can be seen from figure 1 above.

Automation is also associated with the digital Taylorism, the potential of digitalisation to standardise elements of the labour process, which will serve to depress the wages of knowledge workers¹⁸. Whilst digital Taylorism seeks to standardise knowledge work, it is important to recognise that

such processes can only go so far, and that there will remain a premium for those workers who are seen to have the knowledge, skills, creativity and ability to enable transactional companies to outperform their competitors¹⁸. One of the key facets of Digital Taylorism is the “routinisation” of knowledge¹⁹. In order to reduce costs and assert proprietary rights, companies are experimenting with new ways to move from knowledge work to working knowledge; that is, from the idiosyncratic knowledge that a worker has and applies, to working knowledge, where that knowledge is codified and routinised, thereby making it generally available to the company rather than being the “property” of an individual worker²⁰.

Knowledge workers are paid to transform knowledge and defined as someone “whose paid work involves significant time: gathering, finding, analyzing, creating, producing or archiving information”²¹. Productivity is now, more than ever, dependent on the contributions of specialist knowledge workers. Lecturers are knowledge worker^{22,23}. Specifically, knowledge workers must be able to determine the focus of their task, and have autonomy and responsibility for their own productivity²². The implicit model of the traditional knowledge worker is someone who has access to, learns and is qualified to practice a body of knowledge that is formal, complex and abstract^{24,25}. Figure 4 below shows the comparison between traditional work and knowledge work. In many knowledge-based work environments, where creativity and innovation are key, it is intuitive that serendipitous interactions between members of different teams, with complementary expertise or skill sets, can be highly beneficial as a source of fresh perspectives, information, and ideas²⁶.

Table 1 The ideal-types of traditional work and knowledge work

| | Traditional work | Knowledge work |
|--------------------|---|---|
| Education | Requires some formal education and on-the-job learning | Requires extensive formal education and continuous on-the-job learning |
| Skills | Strictly defined skills | Transferable skills |
| The nature of work | High level of standardization, involves working with physical matter either directly or indirectly through electronic interfaces (e.g. control of production processes) | Low level of standardization, involves working with abstract knowledge and symbols (e.g. design and planning of production processes) |
| Organization | Ranges from bureaucracy to teams, fixed roles and positions, knowledge as a secondary production factor | Ranges from professional bureaucracies to self-managing teams, job and task circulation, knowledge as a primary production factor |
| The medium of work | Physical materials and/or people | Symbols and/or people |

Fig 3. The ideal types of traditional work and knowledge work²⁴

In Indonesian higher education institution, lecturers have important role²⁷ as a part of core activities which is learning, specially between lecturers and the college students and also among lecturers, faculty²⁸. Learning is the core activity of higher education institution. Then the lecturers as knowledge workers have important role in facing global competition in higher education sector so their becomes the subject to be discussed in this paper. Facts about automation, digital Taylorism are relating to standardization, routines, objectivity, predictability²⁹, probabilistic of certainty due to rising quantity of human education levels in general. If the two effectiveness models is associated with the university as an organization's, lecturers as knowledge worker tends to be connected in quadrants of human relations internal models and process models as well as employee oriented.

3. DIGITAL PLATFORM AND SOCIOMETRIC BADGE

To answer this challenge is to balance between automation and flexibility by using the digital platform. So it is expected with the presence of a digital platform lecturers can

improve, focus on their quality of learning not just being automated by the system. Technology use, geographic dispersion and organizational structure significantly affect information transfer effectiveness³⁰⁻³³. Organizations using this digital platform could have a better understanding of how they work and how they can improve their daily routines in order to increase productivity, innovation, and job satisfaction³⁴. The platform defines interfaces and employs data transfer and distributed intelligence based on open standards, allowing for a much higher degree of interoperability across applications, disciplines, geographic locations and organizations than is common today³⁵. A platform is a base of the structure that hosts one or more enabling solutions³⁶.

Previous research indicates that there are some important questions is how an individual to know his/her habits in interacting ?; how to enhance organizational effectiveness ?; what should be done to enhance organizational interactions and communications?³⁷. Digital communication is important in the modern workplace, face-to-face interaction still represents a large and important share of organizational communication, information exchange, socialization and informal coordination^{38,39}. Face-to-face communication is a rich medium because it provides multiple social cues through both natural language and body language, and can therefore greatly reduce equivocality^{30,40}.

Sociometric badge is part of the digital platform in order to collect, documenting communication, interaction data. Data mining of digital documents, face-to-face interaction, e-mail, instant messaging, and other forms of communication will provide new information on how complex social structures work, how to optimize human interaction, and how to engineer organizations⁴¹. Social interactions captured using sociometric badges^{42,43}. Figure 4 below shows that sociometric badges in various categories are higher in terms of collecting data which will be analyzed in order to meet organizational goals.

Table 3. Relative Costs, Benefits and Constraints of Different Data Collection Methods

| Technique | Coding Accuracy | Coding Frequency | Coding Granularity | Space/Time Restrictions | Cost/Difficulty |
|---------------------|-----------------|------------------|--------------------|-------------------------|-----------------|
| Surveys | Low | Low | High | High | Low |
| Experience Sampling | Low | Low | Low | Medium | Medium |
| Human Observers | Low | Medium | Low | High | High |
| Video | High | High | High | High | Very High |
| sociometric badges | Very High | Very High | Very High | Low | Low/Medium |

Fig 4. Data collection methods comparison³⁹

Sociometric badges are wearable electronic badges capable of automatically measuring the amount of face-to face interaction, conversational time, prosodic style, physical proximity to other people, and physical activity levels, using social signals derived from vocal features, body motion, and relative location^{34,44}. Sociometric badges are measurement tools that facilitate the study of collective behavior and help organizations maximize their groups' collective intelligence through specialized software that analyzes behavioral patterns and generates automatic feedback reports and dynamic visualizations⁴⁵.

Sociometric badge is useful to obtain, collect, classify and analyze behavioral data that can later be known as behavior patterns to predict behavior that may occur⁴¹. In contrast, the ability to automatically capture not only visible characteristics of human behavior such as face-to-face interactions, psychological processes that occur during social interactions in hundreds of people, at the same time and with a single unobtrusive tool, represents a great advantage³⁴. By using on-body sensors in large groups of people for extended periods of time in naturalistic settings, we have been able to identify,

measure, and quantify social interactions, group behavior, and organizational dynamics⁴³.



Fig 5. The Sociometric Badge⁷

| Table 1. Summary of Behavioral Data Collected by sociometric badges | |
|---|--|
| High Level Behavioral Feature | Badge Data |
| Face-to-Face Networks | Interactions sensed using IR and the microphone |
| Meetings | Gatherings sensed using IR, the microphone, and proximity data |
| Status | Changes in turn taking behavior detected by the microphone (Choudhury and Pentland, 2003), changes in posture detected by the accelerometer (Chartrand and Bargh, 1999) |
| Trust | Emphasis in speaking (pitch and volume) (Waber et al., Forthcoming) |
| Stress | Network structure changes (Waber et al., 2010), movement variance (Yano, Ara, Moriwaki, and Kuriyama, 2009; Olgun Olgun and Pentland, 2010) |
| Anxiety | Speaking speed, movement variance |
| Persuasiveness/Interest | Speaking speed, volume modulation (Curlan and Pentland, 2007) |
| Conversational Dynamics | Changes in turn taking behavior microphone (Choudhury and Pentland, 2003), changes in posture (Chartrand and Bargh, 1999), speaking speed, volume modulation (Curlan and Pentland, 2007) |
| Location | Proximity from fixed-point basestations using radio signal strength |

Fig 6. Summary of Behavioral Data Collected by sociometric badge^{39,48-54}

Figure 6 shows more fully the link between sociometric badge features with important topics in the organization that can be analyzed as part of a decision making. Figure 4 & 6 shows that sociometric badge more likely qualitative to give detailed behaviour data to be analyze. Organizations will become truly sensible when they start deploying hundreds or thousands of wireless environmental and wearable sensors capable of monitoring human behavior, extracting meaningful information, and providing managers with group performance metrics and employees with self-performance evaluations and recommendations^{55,56}. Using data to accomplish the same tasks merely allows you to do this in a more scientific fashion^{56,57}.

Social data of lecturers discussed in this paper are based on Indonesian lecturer's role. In the context of Indonesia higher education institution, lecturers have three main roles (based on tridharma perguruan tinggi): teaching, research and community service^{58,59}. All three main roles can be divided into details activity by Dupak (List of Proposed Establishment of Credit⁶⁰). So in the context of Indonesian higher education, lecturer sociometric badge can know the interaction data externally and internally related detailed activity-based lecturer main role as can be seen in table 1 below.

TABLE 1. LINKAGE BETWEEN LECTURER INTERACTION BASED ON TRIDHARMA ROLES WITH SOCIOMETRIC BADGE

| INDONESIAN LECTURERS ROLES | | INTERACTIONS | INFORMATION GATHERED BY USING SOCIOMETRIC BADGE |
|----------------------------|---|--|---|
| MAIN | DETAIL ACTIVITY | | |
| TEACHING | Implement lecture / tutorial and assistance | Internal with students | the lecturer's teach style, how to communicate, learning methods |
| | Guiding student seminars | | how lecturer communicate and guiding his students |
| | Guiding internship | | how lecturer communicate and guide the students as well as with the company where the student doing his/her internship/thesis |
| | Guiding in generating final report (thesis) | Internal with students and external with the company | |
| RESEARCH | Developing lecture program | Internal with team teaching | how the process of knowledge sharing, conflict, leadership, enthusiasm, team work, dealing/agreement process |
| | Develop teaching materials | Internal with faculty from the same institutions and other institutions | the cooperation process |
| | Delivering scientific oration | Internal with the campus parties, students and also external with industries, government | process about how to collaborate, delivery of opinion, conflict, leadership, perception |
| | Structural positions in universities | Internal with team senior lecturer and the new lecturer | provide coaching, assistant, directing |
| COMMUNITY SERVICES | Guiding junior lecturer | Internal with faculty team and external with another university | how to equalize opinion, expressing idea, provide direction, discussing, collaborating |
| | Conducting assignment to another university for academic development and management at the university | | |
| | Assignment to the academic development of for lecturers from other universities and worked in university homebase | | |
| | Publish the scientific work | | |
| COMMUNITY SERVICES | Translating / paraphrase of scientific books | | |
| | Editing scientific papers | Internal with the same topic interest; lecturers also students, external with researcher, lecturer from another institutions | |
| | Make a masterpiece of design and technology | | |
| COMMUNITY SERVICES | Creating the design and technological masterpiece, art, monumental, literary work | | |
| | Occupy leadership positions in the institutions of government / officials state | External with government / officials state | adjustment, change the style of work to adjust to a new environment, changes in communication, attitude change |
| | Implement the development of | Internal with lecturers also students, external | collaboration, communication |

| INDONESIAN LECTURERS ROLES | | INTERACTIONS | INFORMATION GATHERED BY USING SOCIOMETRIC BADGE |
|----------------------------|--|---|---|
| MAIN | DETAIL ACTIVITY | | |
| | education and research results that can be used by the community Provide training / education / upgrading / lectures to the community Providing public services Create / write unpublished community service work | with researcher, lecturer (from another institutions) government, industries and community | style, ease to work together and adapt, leadership, conflict, division of tasks / roles, the ability to work in teams |

^a. Source: author

From Table 1 above are generally based on the role as an educator (teacher) sociometric badge can collect data related his/her behavior in transferring knowledge (teaching). This is important as a basis for doing check and recheck, introspection and evaluation for lecturers in order to create a good learning environment. The other role is as researcher, sociometric badge potentially play a role in: 1) know the the behavior of lecturers to interact with other researchers 2) how faculty conduct research 3) key success factors lecturer in conducting research from the point of view of interaction and communication (drafting lines of inquiry, taking the data, analyze the data, submit to journals and proceedings). The last role as a community server, sociometric also collect behavior data about how lecturers interact, communicate with external parties such as community, industries and government in order to implement based on their knowledge learned and mastered in order to have real positive impacts.

Lecturers behavior is an important data as an input for higher education institution from system perspective⁶¹. Sociometric badge can also obtain the data interaction and communication about the meeting, for example: how active someone in the meeting? expands the function of a traditional address book by updating real-time social information such as availability, accessibility, and the egocentric social network⁶². In groups with one or more dominant people, effectively reduced the dynamical difference between co-located and distributed collaboration as well as the behavioral difference between dominant and non-dominant people⁴². Sociometric badges have important role to improve interactions across various group collaboration contexts⁴². Propagating social context could transform distance learning, for example, letting users become better integrated into ongoing projects and discussions, and thus improve social interaction, teamwork, and social networking⁴³. From the citation above, it is an affirmation of that sociometric badge role in tri dharma. This is because the lecturers will conduct meetings, discussions, forum, community both with internal and external parties related to teaching, research and community server.

4. CONCLUSIONS

Furthermore, this paper has the potential to be a scientific basis for the empirical research on the detail activity analysis based on tridharma lecturers roles in order to known the Indonesian lecturer behavior interactions pattern. If pattern of interaction lecturers in Indonesia based tri dharma known, is

expected to be a scientific basis regarding taking strategic steps for Indonesia in global competition.

The challenges ahead are linked from the data obtained from sociometric badge lecturer is in terms of privacy also the procedure of granular detailed privacy information collected⁷. Users should have the right to set their privacy settings, have access to their data, know what kind of data is being collected, and decide how their data will be managed; privacy concerns will be overthrown by the potential benefits for the users and the organizations⁴⁵.

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