The impacts of structural and infrastructural elements to service o...

I. INTRODUCTION

With the ever-changing nature of a global business operation that requires firms to adjust rapidly, operations flexibility capability has become more influencing, underpinning the strength of an organization. World-class service organizations rely on right strategies and practices to enhance their operations flexibility. In Malaysia, for instance, the world best budget airline, AirAsia, applies certain principles, practices and procedures that align with its operations objectives to achieve appropriate level of flexibility in their operations that suited its market segments' requirements [1] [2]. In another example, there was a lot of confusion on the part of the passengers and employees of Jet blue airlines in Florida when weather conditions delays flights.

In any eventualities, organization must plan ahead on how to deal with the changing circumstances that will affect their operations. Some of the impact of changes must be dealt at the source through some standardization of products, services and process delivery. The remaining must be dealt with at the point of impact using robust structural and infrastructural resources deployment strategies. Among the most essential move to establish and eventually enhance the operations flexibility is the use of technology especially the IT to better communicate internally within organizational units and

externally with their customers thus providing flexibility in their operations. Others may rely on smart networking with clients and suppliers so that they will handle the uncertainties together as a group. At the same times, having

a flexible workforce will ensure certain level of variability will be absorbed by tactically reassign the workforce. In summary, the changing nature of the environment requires flexibility to be one of the primary competitive components to be applied and considered seriously. To enhance the flexibility capability, firms need to strike a balance with structural and infrastructural decisions. In this paper, we will evaluate the dimension of structural and infrastructural elements and service operations flexibility and their relationship in a multivariate outlook. Few important questions need to be addressed here namely: What is service operations flexibility; what are the important structural and infrastructural elements and how they affect the operations flexibility of service organization.

II. LITERATURE REVIEW

It is widely argued that operations flexibility is very much related to changing the structure and infrastructures of the organizations. However, the discussion on the important elements that fall into each category is debated. In following the definitions given by Hayes and Wheelwright [3], and Schroeder [4] suggested structure resources include capacities, facilities, process technology, and vertical integration whereas infrastructures include people, information system, organization, production and inventory control, and quality control system. Slack [5] suggested labor and technology as structural resources that must be supported by infrastructural assets such as the system, relationship and information couplings.

Relating the structural and infrastructural elements to operations flexibility, there have been several studies done to address the issue. One of the important studies conducted by Correa and Gianesi [6] associated the

broader term of flexibility as ‘ being able to respond effectively to unplanned change’. They linked uncertainty and variability with unplanned change, which require firms to understand the concept of unplanned change. Managing unplanned change can be divided into two dimensions. One is labeled as flexibility in dealing with change after the unplanned change has occurred. The second dimension is the ability to deal with a certain amount of change and reducing the effect of change. This can be done by finding ways to control the changes by implementing strategies like forecasting technique, maintenance system, parts standardization, and manufacturing focus. These strategies are to prevent and avoid the change before it occurs. This is where the structural and infrastructural elements play their roles. For example, in order for service firms to be able to implement the chosen strategies both before and after the occurrences of unplanned changes, firms ought to have suitable structural elements such as integration and technology supported by systematic infrastructural elements such as quality leadership and teamwork activities.

Harvey et al [7] explained that a flexible firm is the one that can handle variability with minimum penalty and suggest the difference between internal robustness and external flexibility. Internal robustness must be dealt with minimum efforts due to the fact that it will not create value to customers. Harvey et al [7] suggested that in order to deal with the internal variability, firms may require organizational arrangement such as cross-functional teams, empowering contact personal, and building a flat organization, which factors are related to infrastructural elements of operations as well as modifying the structural elements such networking

capability. It is the external flexibility that must be managed carefully in order to gain competitive advantage. Central to the issue, Harvey et al [7] proposed the use of structural element, mainly IT technology in order to manage flexibility.

This is also supported by Bucki and Pesqueux [8] who also proposed the components of operations strategy on structural and infrastructural elements that contribute to operations flexibility. Adler [9] agreed that flexibility in organizations is a useful tool to improve firms' competitive position as related to the use of technologies in implementation and the decision-making process. Upton [10] supported the idea and added that firms should create an infrastructure to allow for system flexibility. As a result of technological improvement and changes in customer preferences, service operations have become flexible and this requires adjustment in the delivery process. Upton [10] also pointed out that customers expect and prefer to get services at their convenient time and location, therefore capability on the part of the service provider to be flexible is imperative.

One specific example on how structural elements such as technology and integration play an influencing role in service operation flexibility is the use of ATM machines. Banks that have ATM services have been providing convenient services to customers for years. In accordance with this, ATM services have improved over time. Two of the improvements mentioned include the increase in the limit of the amount in withdrawal transactions and the multiplication of ATM units strategically situated in many convenient locations. In elaboration, ATM services nowadays are not solely restricted to bank premises but can also be found at airports, petrol stations, bus stations,

fast food restaurants and many others. The change in the way banks deliver services indicates the degree of flexibility in service operations that benefits banks and customers alike. ATM technology may require some investment on the banks' side, but in the long run, it reduces operating costs by decreasing the number of staff at counter services. Davis and Heineke [11] concluded that reduction in customers' waiting time at counter services by improving better services management of process design can certainly reduce customers' dissatisfaction and defection and technology could help to achieve this goal.

Technologies have proven to be able to offer more opportunities in improving services processes. Collier [12] in a study on electronic devices for check-in and check-out systems in the hotel industry, automatic toll booth in transportation, electronic fund transfer in banking services, the practices of " e-ticketing" in the airline business have given huge impact on the ticket purchasing system, airport checking process, and service industries as well. Therefore, in responding effectively to customers' demand variations, improving services process design by using technology is another approach to increase flexibility of the service system.

Based on the above discussion, we have recognized several elements that must be considered in enhancing flexibility capability of a firm which could be further divided into structural and infrastructural elements. Among the most cited structural elements in discussing the service flexibility is technology, particularly the ICT, integration, and facility. With regards to the infrastructural elements, some of the most important factors cited in the literature are team management, worker empowerment, and quality

leadership. As for the dimensions of service operations flexibility, we incorporate the types given by Correa and Gianessi [6] who suggest service flexibility capability as design, package, volume, delivery time, delivery location, system robustness and customer recovery with Harvey’s internal robustness and external flexibility[7].

Thus, we hypothesize; H1: Structural elements consists of facility, location, technology, integration/networking positively influence the external flexibility; H2: Structural elements consists of facility, location, technology, integration/networking are positively influencing the internal robustness, H3: Infrastructural elements consists of teamwork management, worker empowerment, and quality leadership positively influence the external flexibility, H4: Infrastructural elements consists of teamwork management, worker empowerment, and quality leadership positively influence the internal robustness

We also propose that the infrastructural elements are more dominant in service industries as the soft power related to human potential are the silent forces that determines the operations flexibility, H5: Infrastructural elements have a greater influence on both external flexibility and internal robustness as compared to the structural elements.

III METHODOLOGY

This research uses a survey approach. We employed several techniques leading to the final large scale survey. First we conducted a thorough literature review on topics leading to the development of items to measure structural and infrastructural decisions and operations flexibility.

Subsequently, the researchers conducted several interviews with operations managers in selected service companies namely; hotel, port management, and airline, to check if the factors found in the literature are relevant to the practical ideas of the managers, particularly in the Malaysian business environment. This technique allows the researcher to explore any relevant ideas pertaining to the issue. The interview will also provide some valuable information on the keywords or the indicators from the Malaysian perspective since the literature is too replete with studies from the different environments of western countries. Each session usually takes more than an hour.

Combining the literature review and the interviews, an instrument was developed to measure structural and infrastructural elements, and operation flexibility. The structural and infrastructural elements are mainly adapted from the instruments developed by Boyer and McDermott [13]. The items to measure operations flexibility capability are taken from Correa and Gianessi [6] and Harvey et al. [7]. In summary, the instrument consists of (A)Infrastructural elements divided into worker empowerment(7 items), quality leadership(6 items), team management (4 items) (B) Structural elements consists of location(2 items), integration(5 items), technology(6 items) and capacity(2 items) (C) external flexibility (6 items) and internal robustness (5 items). A sample of questions is given as follows;

Technology: Indicate level of investment in the latest technology relevant for enhancement of the business operations (e. g. latest scanning system for hospital or new ATMs for banks)

Capacity: Indicate the level of investment in upgrading / improvement of existing facilities

Several workshops and discussion were conducted leading to the final version of the instruments. Before conducting a pilot study, we pre-tested the instrument on our MBA students, whose backgrounds included experience working in service organizations to identify potential problems with respect to the ability of the respondents to understand the questions asked, and clarify the instruments when it is necessary. No major change was made. Consequently, a pilot test was done to test the reliability and validity of the instrument. This is also done to minimize the administration of the questionnaires in the real study. 30 companies were conveniently selected to test the instruments. 25-100 observations were thought adequate for this purpose [14]. The reliability of the instrument was assessed before we proceed with the large scale study. We employed the Cronbach alpha method in gauging the reliability of the scale. All constructs show the alpha coefficient of greater than 0. 7. We concluded that the measurement scale is reliable and thus, will maintain all items measures.

The large scale study that involved companies from 9 service industries was followed subsequently. Instead of using mail, which often result in poor response in an emerging economies countries such as Malaysia, we sent enumerators to operations managers or equivalent positions whom we had contacted earlier and expressed their desire to participate in the study. To choose the companies, we used the appropriate directory when it is available. For example, for the hotel industry, we utilized the Malaysian Hotel Association directory and select hotels with the rating of three stars and

above. The selection represented both low contact and high contact category [15] :(a) Hotels (Service factory);(b) Fast foods (service factory);(c) Auto repair (Service shop);(d) Private hospitals (Service shop);(e) Private colleges; (f) Retailing (stores) (Mass service);(g) Retailing banking (mass service);(h) Accountant(Professional);(i) Architect firms(Professional). The total final response was 254 firms.

We then analyzed the data using the appropriate statistical techniques such as Factor Analysis and Regression Analysis

TABLE 1 SERVICE CATEGORIES

Sectors

Frequency

Percent

Hotel

Fast Food

Private Hospital

Auto repair

Retail stores

Retail banks

Private colleges

Architect

Accountant

Total

31

30

24

26

30

30

30

30

23

254

12. 2

11. 8

9. 4

10. 2

11. 8

11. 8

11. 8

11. 8

9. 1

100

III. RESULTS

Descriptive Statistics: We had about equal numbers of respondent across the 9 industries as shown in Table 1. With regards to the years of operation, more than 30% of all companies have been in operations for more than 10 years. Of all respondents, close to 60 percents are managers or above with 7. 1 percentile hold top management positions. Most firms (about 60%) do business locally or nationally whereas about 25 % cover international market.

Factor Analysis: A series of factor analysis was conducted to establish uni-dimensionality of the variables and to reduce the independent variables (structural and infrastructural elements) and the dependent variables (external flexibility and internal robustness) to appropriate factors. In doing this, there is an opportunity to redefine or reduce the number of factors according to the commonalities within the variables. SPSS provides the test for the appropriateness of the use of factor analysis and the adequacy of the

sampling size. Bartlett tests indicate that factor analysis is suitable and the KMO test calculated that the sample is enough to conduct factor analysis. The first analysis on the structural elements resulted in three factors with percentage variance explained 74. 674 percent. We define the factor as facilities related factors (capacity and location), technology, and integration/networking. We then run the second factor analysis for the infrastructural elements and found only two factors with 64. 958 percent cumulative variances included and name the factors as teamwork management and quality leadership. Finally a separate analysis for external flexibility and internal robustness, as suggested from the theory, maintain most of the items that measures both constructs. The results of exploratory factor analysis shed light on structural, infrastructural elements and the service operations flexibility: external flexibility and internal robustness. The previously mentioned separate structural factor; facility and location, were remerged into one factor that we could call ‘ a facility related factors. Examining the items that measures capacity and locations seem to highlight the facility issues and the merging is not totally surprising. Meanwhile, worker empowerment from the infrastructural elements was diluted as some of the items are highly correlated with the team management. This is also justifiable as the team needs some forms of empowerment to be able to work effectively. We however intend to cut short the detail discussion of the result s of the factor analysis as the emphasis of this study is on the impacts of the independent variable to service operations flexibility.

Multiple Regression: The first model with internal robustness () as the dependent variable has a good fit with R = 0. 662 and R square = 0. 439.

The strongest factors to influence the dependent variable seem to be the structural elements, with technology (¢ = . 387; t = 6. 839), capacity location (¢ = . 320; t = 5. 706), integration/networking (¢ = . 180; t = 3. 353) show the highest beta-coefficient consecutively. Only team management, one of the two factors of infrastructural elements significantly influences the dependent variables. (¢ = . 156; t = 2. 609). The second model has also a good fit with R = 0. 686 and R square = 0. 471. This time, technology also plays an influencing factor (¢ = . 342; t = 6. 219), followed by capacity/location (¢ = . 299; t = 5. 499), integration/networking (¢ = . 197; t = 3. 783), team management (¢ = . 187; t = 3. 215), and quality leadership (¢ = . 151; t = 2. 678). Here, it seems that quality leadership factor play a significant role in delivering the external flexibility of a service firm. We also notice a reducing degree of influence of structural elements (except integration/networking) to affect the external flexibility of the service firms. Further, it is also quite surprising to observe the structural elements enforcing a higher degree of influence to the service operations flexibility where as we hypothesize that the soft elements of infrastructural should lead the list. The results enable us to confirm H1, H2, H3, and H4 but H5 which it is partially confirmed. This requires further explanations that will be discussed in the next section.

IV. DISCUSSION

This study confirms the importance of structural and infrastructural elements to the service operations flexibility. As suggested from Harvey et al [7] that the variability will have to be dealt with organizational arrangement such as cross-functional teams, empowering contact personal, and building a flat

organization, which factors are related to infrastructural elements of operations as well as modifying the structural elements such as networking capability. Our study not only supported the literature but also specifying which factors contribute the most to the operations flexibility.

Contrary to our belief that the soft elements will impact more on the operations flexibility of service firms, we found that the structural part especially the element of technology show a greater influence. We believe this is not totally unexpected as the infrastructural parts have also been found in the literature to play a supporting role in the operations effectiveness. Idris and M Ali highlighted the importance role of quality leadership and best practices in steering the effectiveness of firms [16]. Idris et al. [17] emphasizes quality leadership as an important component of organizational capability to drive company performance. Hussain et al [18] also proposed the prime role of leadership in their Excellence model.

Further, regarding a reducing degree of influence of structural elements (except integration/networking) to affect the external flexibility of the service firms, this study highlights the role of infrastructural elements on the enhancement of the external flexibility. External flexibility usually deals with the customer demand that require more involvement on the part of the human resource to bring about the needed adjustments whereas more structural elements such as technology is needed to provide consistent internal results in the form of less confusion and glitches.

Implying the results, service companies must invest in the structural elements such as technology and networking capability to boost the

operations flexibility. These initiatives must also be back up with the human dimension in the forms of team management, and quality leadership. By recognizing the five factors prescribed in this research, a service company would be able to develop and strengthen the operations flexibility of their firms.

There is no further analysis of the categories of service companies that may moderate the level of deployment of structural and infrastructural resources. For example, it is a possibility that a low contact service firms will utilize higher level of technology as compared to professional services. Thus future studies should highlight the issues. In addition, the importance of having operations flexibility may also be moderated by the competitive priorities of the companies and the categories of firms themselves. It is presumed that those companies who strive to make flexibility as their top agenda will deploy higher level certain structural and infrastructural resources as compared to those who have cost minimization as their operation objectives. Finally, this study uses managers' perception to assess the operations flexibility. Other objectives measures should be explored for future studies

V. CONCLUSION

In this study, we investigate the relationship between structural and infrastructural elements and their effects on service operations flexibility. We divide the structural elements decisions into capacity, location, integration/networking, and technology while infrastructural elements decisions include worker empowerment, quality leadership, and team management. Service operations flexibility is divided into internal robustness

and external flexibility. An instrument to measure all the factors is designed and pre-tested on 30 MBA students with slight changes as required. Thereafter, a pilot study was directed to operations managers of 23 Malaysian service organizations to check the reliability of the instrument. All items used to measure the studied factors are found to be reliable. Factor analysis readjusts our independent factors. With the new defined factors, we regresses them against the internal and external flexibility. We also found the dominant influences of structural and the supporting influence of infrastructural elements to the service operations flexibility.

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