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Post-Merger Technology Integration Issues

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I. Background And Importance

Bigger Is Better. Over the last fifty years, there has been a steady increase of merger and acquisition activities ("M&A") around the globe. Firms have a general aspiration to become larger in size because it brings several inherent advantages. First, there is economies of scale in production and in operations (Stylianou 1996). Larger production runs spread fixed costs over a larger number of units, resulting in lower unit cost. Many operating expenses do not increase in proportion to increase in usage. As a result, lower unit cost from production and operations means lower breakeven point and lower operating risk. Second, larger firms have higher market power vis-à-vis suppliers, customers and competitors. When a firm becomes dominant in an industry, it can exert market power over its suppliers because it is the largest buyer. It can secure resources at a lower cost due to its higher volume. From the customers' perspective, they have fewer choices in terms of product offerings and the dominant firm can dictate more of the overall market conditions. Competitors normally base their decision on market environments that are determined more by the dominant firm. Third, larger firms can capture and capitalize opportunities more easily than its smaller counterparts because it has more resources from economies of scale and market power. These opportunities can include acquisition or development of new products, patents, technologies, talent, or geographical territories (Robbins 1999). Advantages of being a dominant firm can be seen in the semiconductor industry composing of Intel and AMD and the computer software industry composing of Microsoft and numerous other smaller firms. As a result of these inherent advantages, most firms have a preference to grow larger in size over time.

From a survival-of-the-fittest viewpoint, firms that are more successful will naturally grow larger over time. As customers sought after the firms' products, its sales will increase. Higher sales lead to larger inventory and a bigger employee base to serve customers.

Production facilities will need to be added to serve the increasing demand. Hence successful firms will naturally grow larger over time.

How To Get Bigger? Buy Or Build. There are two ways in which a firm can grow in size – it can buy another firm or it can build a new operation from scratch. Buying another firm is to grow through external means; building a new operation from scratch is to grow through internal means. Buying another firm can provide instant growth and goodwill, an established customer base and brand name. However, the purchase cost might be expensive and there will be integration issues. Building from scratch can ensure a congruent corporate culture and product offerings, strong integration, and the ability to control the business as it grows. However, it is extremely time consuming and many resources cannot be replicated. For example, desirable store locations, patents, a loyal customer base and strong brand names are very difficult to replicate successfully. Based on the industry and operating environment and firm characteristics, firms choose the best alternatives to grow in size.

Getting bigger through internal growth (build) is a constant and continuous process and its developmental course is subject to changes in firm strategy and market conditions over time. For this paper, the focus will be on growth through external means, i.e. through merger and acquisition of firms. Some research have differentiated between mergers and acquisitions. Mergers are described as a combination of two equal firms, while acquisitions are described as the purchase of one firm by another. There are definitional differences, internal political issues, and operational variations between the detailed working of mergers and acquisitions; however, the focus of this paper is on the effects of post-merger technology integration and which firm is performing the actual buying is of lesser relevance. Hence, merger and acquisition activities will not be differentiated unless there is an obvious difference between the two within the context of this paper.

Why M&A? In additions to the benefits given above on being a larger firm, there are other advantages in getting bigger through M&A. The main rationale behind M&A is to enhance a firm's competitive advantages through the synergistic effects that arise from the combination of two firms (Porter 2001). M&A does not need to result in a larger firm provided that synergistic effects can be derived. Firms can backward integrate vertically to ensure a constant supply of input materials. Firms can forward integrate vertically to lock in distribution channels for its output. Firms can integrate horizontally by buying similar firms to enlarge its market share or product offerings. Firms can also integrate horizontally into unrelated businesses to either generate synergistic effects or to reduce risk through diversification (Anderson 2001). Generally, firms are trying to take advantage of what others have build over time; in addition, firms would like to derive incremental benefits in terms of synergistic effects. As such, M&A are very common among firms in both the developed and developing countries.

Other Reasons For M&A. There are other less objective reasons for M&A. First, CEOs have a self-interest to grow firm size as it is indirectly related to his or her compensation (Bliss 2001). Generally, the bigger the firm, the higher the compensation. Second, some firms are more of a follower in terms of strategy. They do what their competitors do or they follow the general industry trends in terms of strategic selection. For example, Westinghouse followed General Electric in terms of strategic directions from the 60's to the 80's. Over the last fifteen years, Westinghouse has been more proactive in divesting non-core businesses when management became more open-minded and innovative. Third, firms engage in financial maneuvers to increase firm values. The price-earning ratio is a very common benchmark used in financial analysis of firms. There is a range of expected price-earning ratio for each type of business dependent on their future growth expectations and risk. Firms can on occasions

maneuver their price-earning ratio using M&A to increase their share price and total market capitalization. Fourth, the availability and cost of resources to perform M&A will affect the level of M&A activities. For example, the high stock valuation and ease of obtaining financing from 1995 to 2000 gave many firms a very cheap currency with which to acquire other firms.

M&A Activities And Its Goals. When we reviewed the nature and the purpose of the M&A activities, there is a disparity of goals that is partially dependent on the economic conditions at the time (Andrade 2002). The purpose of acquisition during periods of strong economic growth is generally different from the purpose of acquisition during periods of weak economic growth. Over the last 50 years, there had been waves of vertical and horizontal integration through M&A. The initial M&A waves consisted of many vertical integration activities to secure supply of input materials or sources of customer base. The economy was more manufacturing based during this time, and having a secure source of input and customers for output was a competitive advantage. Over the last 20 years, other M&A waves consisted of many horizontal integration activities for risk diversification. Firms bought competitors to gain a larger market share, explore synergistic savings, or secure access to physical, intellectual, human or financial assets. Firms in unrelated industries were acquired to gain diversification in customer base, revenue stream, operational assets, or earnings and cash flow profiles. Over the last 10 years, another wave of M&A activities were completed based on promise of future opportunities and their ensuring profits. These M&A activities evolved mostly around information and communications technologies ("ICT") related companies like telecommunications firms, internet startups or cable companies. Since mid-2000, the global economy has encountered one of the more severe and prolonged periods of economic retrenchment. Many firms were forced to divest their non-core businesses and

refocus on their core businesses. Many financially secure firms were able to acquire assets at very reasonable prices. From the above observation, we propose that firms' M&A activities have different goals and objectives which are predominately base on the prevailing market conditions and economic growth outlook at the time.

Proposition 1: Firms are more likely to use M&A to increase market share or enter new markets during periods of economic prosperity.

Proposition 2: Firms are more likely to perform M&A to achieve cost savings or synergistic effects during periods of economic difficulty.

Change in Technology. While technology can be defined as any innovation used in the business environment, this paper will limit technology to mean the latest electronic operating assets of the firm. Hence, the earliest technology under this definition includes simple electronic calculators, developing later into mainframe and personal computers. Subsequently, technology evolved into networked computers and information and communications technologies ("ICT"). Networked computers link information within a firm environment, while ICT allows communications and information exchange between networked systems within firms.

The nature of technology and their use evolved over time. Initially, technology was used to assist or replace repetitive computational tasks like accounting and salary calculations. Then technology was developed to enhance manufacturing process like coordination of machineries and output quality control. Computing technologies also enhanced and automated many aspects of the daily running of the economy. As this technology developed, it began to perform tasks like weather or disaster predictions that requires much more

complex calculations. With the development of networked computers, knowledge and information within the firm can be shared for value creation. With the latest development in ICT, information transmission and exchange are the main driver. ICT allows the convergence of telecommunications, broadcasting, information technologies and entertainment (Bores 2002) and access by firms and individuals globally.

Standardization of Technology Platforms. As firms grow and adapt to changing market conditions, their systems will evolve to accommodate the informational and operational requirements of the organizations. Prior to ICT, firms developed technologies mostly on their own because it was for their own use. Firms also want to keep the system proprietary because the software and hardware system were the competitive and strategic advantage. As the computing technology matures, the trend evolved to the use of a more standardized and modular system. The main reason for the standardization and modular design stems from cost reduction needs, ease of information exchange, and expansion possibilities. As the proprietary systems become more complex, the systems become more difficult to maintain and update as dedicated technology teams are required. The dedicated technology teams and their training increase the cost of running a proprietary system. There are also many occasions when information must be shared with other entities. When proprietary systems are used, information exchange is more difficult because of data or format incompatibility (Stylianou 1996). Special training might be required just to ensure proper use and access of the information. Proprietary systems also have limits to the amount of upgrades and advancement that it can handle. For example, the PC based DOS system was not designed for graphical use and it has very limited capacity to perform acceptable graphical work as compared to the Windows operating system. As the computing technology and ICT mature, standardization in software and hardware architecture becomes more prevalent. The use of a

standardized open system using the modular design can alleviate most of the shortcomings of the proprietary systems. First, specialized firms that cater to each type of technology will appear. Since the developmental and upgrading cost can be shared among a pool of users, the cost to each user is greatly reduced. For example, the availability of Microsoft Office has reduced the need for firms to develop word processing and spreadsheet programs on their own. Even with a customized system, data compatibility is of utmost importance. Second, as the system becomes more standardized, there will be more and more knowledgeable users in the market. System maintenance and upgrades can be outsourced or performed in-house more economically. Customization of the technology can also be performed easily using the standard platform as a base for development. For example, many database structure can be build using Microsoft Excess as a platform by outsourcing firms. Third, a standardized platform allows user of the technology to focus on the content rather than the usage aspects of the job. For example, users of Word and Excel programs can be certain that their files can be read and used by most recipients. They do not have to worry about file or data incompatibility issues because of the programs' wide acceptance in most industries. Fourth, modular design can lower the cost of maintenance and expansion of the system. Maintenance costs are lower because modular setup is easier to analyze and firms can only purchase the required modules. Expansion costs are lower because firms can upgrade or expand selected capabilities of the system.

Proposition 3: As computing technology becomes more mature, there is more standardization in terms of software and hardware for business activities.

Proposition 4: Infrastructure has become more modular in design and data is more mobile because of higher compatibility.

With maturing computing technology and the appearance of ICT, the standardized open system with modular design becomes the norm. In order to take advantage of the full capabilities of ICT, knowledge, information and data must be platform-independent to avoid incompatibility issues (Bores 2002). Although the hardware systems have generally developed based on industry standards, the software systems have been using relatively incompatible designs historically. For example, computer hardware systems can be ordered from different manufacturers and most of the components are interchangeable between brands of manufacturers. Computer software integration is much more difficult because of the programming and software codes involved. As a result, there is very little mix and match of computer software systems. However, there are applications that has gain popularity and there is a network externalities effect (Frambach 2002). For example, Microsoft's Word, Excel and Powerpoint programs have gain such a market share in the business environment that they can be considered as industry norm. For more complex software systems, SAP, Oracle and IBM can provide very comprehensive range of enterprise software solutions for EDI, ERP, global supply chain management, and CRM. As these systems gain diffusion and become more standardized, firms will outsource these operations because it is cheaper and proprietary systems are no longer a competitive advantage. For example, no firm will spend valuable resources to develop their own proprietary word processing or spreadsheet programs. Instead, firms will either purchase or develop customize modules that are add-on to Word or Excel. These add-on modules include Endnote referencing system for Word and Crystal Ball statistical package for Excel. For enterprise systems, firms find it more economical to outsource the system set-up and development to specialized technology firms. Some will even outsource their data compilation process. As these specialized technology

firms can spread their system development costs over many customers, all firms benefit from lower costs. In addition, there are information and technology spillovers that can benefit all firms in the industry (Zaheer 2001). The lower costs and faster technology diffusion will eventually benefit the downstream customers. For example, many global banks and MNE have outsourced their technology development and maintenance in multi-year multi-billion dollar contracts (McWilliams 2002; Spagat 2002). With these developments, the software and hardware infrastructure have become more standardized and the data and information become the sole source of competitive and strategic advantage for the firms. The firms must be able to utilize its information and knowledge capital efficiently, effectively, and in a timely manner to compete successfully.

Proposition 5: The software and hardware technology infrastructure is becoming less important with the trend of open systems and outsourcing.

Proposition 6: The vital part of each firm's competitive advantage with respect to technology no longer lies in software or hardware technology. The vital part of each firm's technological competence lies in its core customer database and the ability to data mine useful information from the database.

II. Problem And Objectives

When a firm merges with or acquires another firm, it faces several alternatives in terms of its technology. They can leave both firms as separate entities with very minimal integration; there might be some sharing of information and database, but there will be no integration of systems or departmental resources. Firms might prefer this approach if: (1) the acquired firm might be sold in the near future, so integration does not have any long term benefits but will

incur short term cost, (2) the firms are in completely different types of business so that there is no overlap in terms of technology or their functions, (3) the firms have concerns for high cost of integration or cannot decide on the appropriate approach, platform or systems, (4) the firms are waiting for a complete corporate wide integration. Firms can also have one firm merge into the other in terms of technology integration. Most likely scenario will be the acquiree being absorbed into the acquirer because of the power positions. In some cases, the acquired firm might be taking a step back in terms of technology because the acquiring firm is not as advanced technically (Johnston 1996). Firms can also do an equal merger of the technologies between the two firms based on capabilities. The final tech department might have a well thought out system, but conflicts, time constraints, cost overrun, and political issues are likely to arise in the process (Johnston 1996).

Whenever a technology integration is planned to take place, it might adversely affect the operation of the firm (Robbins 1999). First, there are generally additional costs involved in integrating systems. Additional systems specialists, equipments, or outside consultants will need to be retained to ensure the seamless integration of the systems. Second, the operational units might lost temporary access to vital data that might disrupt the firm's normal operations and reduce the firm's short-term effectiveness. Third, inadequate planning of the future technology requirement might result in improper use or selection of systems that limits the technological capabilities of the firm. Fourth, the execution of the integration process must be performed properly and timely. It will require coordination from all departments within the firm. As a result, resources that are used for the development of the new products are diverted to support the integration efforts (James 1998).

There are many technology and non-technology factors that affect the planning and implementation of the integration process. First, top management must support and recognize

the importance of the integration process, and sponsorship is needed to get the integration completed in a timely manner. Second, integration can be completed in a timely manner if there is a commonly perceived threat to organizational or economical survival from outside competitors or changes to the external environment. Third, having a spokesperson from top management that takes charge of the integration process can increase the likelihood of a successful integration. Fourth, the merged firm needs to have an internal culture that is open to change and adaptation so that change and integration initiatives are accepted. The above factors are instrumental in having a successful integration process.

Despite integration planning and management participation, integration is still a process that is vital but difficult to complete successful (Sherman 2002). With the trend of systems becoming more open, standardized and modular, we want to test the propositions that these systems can make post-merger integration easier because of their structure. As a result, this paper will focus on propositions 3 and 4. This paper will also provide some evidence to support propositions 5 and 6 in that the data itself and the information that it provides have become the competitive advantage that firms can leverage off from.

III. Literature Review

The standardized and modular infrastructure is a relatively recent technological development within the last five to ten years. Hence, there have not been much research being done on this topic. There are research studies that try to formulate what firm factors will make successful post-merger technological integration. For example, a study found that prior merger experience, IS participation in merger planning, quality of merger planning, criteria used for setting IS integration priorities, and a high level of data sharing across applications are factors that have a positive influence on the success of the IS integration (Stylianou 1996). Another

study found that the main factors in pre-merger negotiations and post-merger integration process are IT intensity and cultural differences between firms (Weber 1996). Another study found that past integration experience, IS integration planning, positive support by executive management, high-quality communication to the end-users, and a high level of end-user involvement in strategic IS decision-marking process, and an emphasis on IS standardization are important factors (Robbins 1999). Simplicity of integration and difference in management needs was found to be important drivers in choosing the strategies for IS integration in another study (Giacomazzi 1997). A study of a bank merger in Australia indicates an understanding of the organizational and strategic fit at the IT level can contribute to effective management of IT integration (Johnston 1996). Another study outlines four ways to improve acquisition of technology; these factors are chief executives awareness of required training at certain levels, continuous involvement of technology managers, use of technology managers for more broad based strategic planning, and recognize the real and hidden cost of post-merger integration (James 1998). A study by Carrillo of British firms revealed that quality leadership, effective communications, swift changes, and cultural compatibility are factors that facilitates integration (Carrillo 1998). Another study postulates that the post-merger process is often affected by internal arguments, resulting in loss of tempo and customer focus. These effects are not fully accounted for in the calculation of the benefits to be gained from the merger (Berggren 2001). There has been no research paper that tries to determine if a standardized and modular technology infrastructure will facilitate post-merger technology integration.

IV. Framework And Methodology

Technology and the business environment change constantly. Firms also have to operate under their own sets of internal and external constraints. Hence, performing detailed analysis of individual firms using case study methodology does not mean that the findings can be generalized to other firms. Longitudinal study might not be appropriate as well because technology and business environment change over time; and studying solutions to old problems might not be useful in solving current issues. As a result, this study will use a survey type questionnaire to obtain a more macro view of the situation to arrive at a conclusion to confirm the propositions.

Methodology Overview. This study tries to determine if a particular type of technology infrastructure facilitates post-merger technology integration. The sample population should consist of all firms that had undergone a merger. Then the population should be segregated into two groups, one group who has adopted the subject infrastructure and one group who has not. A survey will be used to evaluation any benefits that might have arose from the structural difference between the two groups.

The following methodology will be used. First, a total population of firms that have undergone M&A activities within the last three years is selected. The information can be found in M&A reports and industry publications. As most M&A activities concentrated in the Americas and Europe, the focus will be on firms within these two geographical regions. Second, firms within the total population that have implemented a standardized and modular technology infrastructure are selected. This will be determined using the survey questions, contacts with selected technology firms, and review of industry news. Firms that have migrated to the standardized and modular infrastructure will be our experimental group, while firms that have not migrated will be our control group. Third, surveys will be emailed

to the target respondents and results collected and tabulated. Responses from the surveys will be compared to determine if the standardized and modular infrastructure facilitates post-merger integration.

The Survey. The survey should serve two purposes. First, it should provide information for us to determine if integration was facilitated by a particular type of technology infrastructure, namely a more standardized and modular system. The reference point should originate from the technology department that performed the integration work. The targets for obtaining this information are the CIOs and the technology managers. Second, the survey should provide usability information to determine if the integrated system was at least as easy to use as the pre-integration system. The reference point should originate from the end-user of the system. The targets for obtaining this information are actual users of the integrated systems. Our survey has three modules, one for firm information, one for technology information, and one for usability evaluation. The table below outlines the general nature of questions that will be used in the survey and their target respondents.

Survey Questions Categories	CIO	Tech Manager	End-User
Organization Related: - Industry that the firm is in, nature and types of products. - Annual sales, number of employees, geographical reach.	**X**		
Technology Related: - Nature of technology infrastructure (hardware & software). - Standardization and modular system usage (if applicable). - Size of technology group and resource availability. - Management view on technology. - Nature of system and data in firm being merged. Integration Related: - Length of time required for integration. - Self-rating of integration success. - Difficulties during the integration process (open ended). - Recommendation for improvements (open ended).	**X**	**X**	
Usability Related (when compared to the pre-integration system): - Satisfaction with design of integrated system. - Satisfaction with integrity of integrated system. - Satisfaction with usability of integrated system. - Recommendation for improvements (open ended).		**X**	**X**
Overall Integration Related: - Overall satisfaction with the integration process (open ended). - Overall satisfaction with the integrated system (open ended). - What should be done differently? (open ended). - What can be done in the future? (open ended).	**X**	**X**	**X**

More detailed questions will be used to evaluate each of the criteria above. The survey will use a 5-point scale for each question, ranging from “Highly Agree” to “Highly Disagree.” The selection “Not Applicable” will also be available as response to selected survey questions. Some questions are open-ended so that respondents can provide more in-depth feedback on the integration process.

V. Schedule

The survey will be completed under nine stages. We expect the survey to take not more than 30 weeks. External factors will affect the timing of the completion of the survey. These factors include availability of funding to support the process, nature of responses from the selected companies, and possible need to recalibrate the survey structure.

Stage	Week	Process
1	**1-2**	Review of our propositions and design of survey questions. Data collection on firms that have undergone a merger within the last three years. Sources should include industry publications like Mergers & Acquisition News and newspapers and analyst reports.
2	**3-6**	Testing of survey by an independent panel of technology consultants in the industry. Contact technology firms that offer standardized and modular systems and industry news to select a list of firms from the total population that use a standardized and modular infrastructure to be used as our experiment group. These technology firms would include IBM, Oracle, SAP.
3	**7-8**	Tabulation of selected firms and their information for the survey. Contact selected firms using telephone to inform the relevant person of our research as a courtesy. We should also confirm if the correct person is being contacted for our survey and their corresponding email address. Then email the survey to selected person within the target firms.
4	**9-11**	Monitor responses received. Follow up to the first survey with a second survey three weeks after the first survey is emailed out. We would reiterate the importance of this research findings to the target firms' operation.
5	**12-14**	Monitor responses received from the first and second mailing of the survey.
6	**15-16**	For those that we have received a response, follow up with a telephone and email appreciation note. For those that we have not received a response for, telephone for a follow up.
7	**17-18**	Tabulation of responses from survey. Note special situations or written explanation. Follow up through telephone.
8	**19-22**	Analysis of information collected from survey. Evaluation of deviations from expectation.
9	**23-26**	Write-up and reporting of research results and findings.

A more detailed Gantt chart with resource requirements and their allocation can be provided in the next stage of this paper.

VI. Possible Industrial And Academic Implication

If our propositions that a standardized and modular technology infrastructure makes post-merger technology integration easier are correct, then firms should migrate to this type of system over time. By migrating to this type of system, firms will have a higher probability of successful technology integrations. In addition, when system infrastructures are being evaluated for adoption or purchase, the ease of integration should be taken into account in the evaluation process.

VII. Conclusion

Based on preliminary evaluation, I expect that firms that have implemented a more standardized and modular technology infrastructure will be able to integrate more easily with another firm after a merger.

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