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**Archiving for Integration:
To Fit or Not to Fit That is Not the Question, Causal Ambiguity is!**

This paper outlines core research themes of Operations and Supply Chain Management – arcs of integration, organizational fit and best practices – that argue that better integration of the supply chain’s focal company with its suppliers and customers tend to lead to better performance measures not only for the focal company but also for the supply chain as a whole. This argument mimics the message of organizational fit: better fit between organizations – through shared, context-independent best practices – may be the cause for better operational and market performance. For empirical testing and validation, both research streams relied on surveys, mostly single-respondent ones. In this essay, we restate our earlier arguments that 1. fit is context dependent, so it is futile to argue that better fit is always better; 2. surveys, in general and single respondent surveys in particular, are inherently ill-suited to grasp and to describe organizational intricacies, like fit between companies, and 3. “soft issues and resources may serve the hardest barriers to entry for other firms”.¹ The message of this essay is that neither the arcs of integration nor organizational fit determine organizational success or failure, rather the underlying human factors, employees’ social acculturation combined with factors of inter-firm and intra-firm causal ambiguity make organizations fit or not fit for working together and to succeed or to fail.

Arcs of Integration and Organizational Fit

Many moons ago, we coined the term “Martini Merger” to describe how alliances or networks are conceived: “Behind this study runs the theory of the ‘Martini Merger’. Such an alliance is conceived in general terms, signed by senior managers (often in a remote spot like Bermuda), and is applauded by important political figures. The deal is then left to operational people to ‘work out the details’. If there are differences between the two firms’ operating practices, the theory goes, it may be very difficult (or impossible) to realize the benefits initially contemplated from the merger.”²

This tongue-in-cheek term highlighted the importance of matching operational details in establishing and managing alliances and supply chain networks. In other words, it highlighted the importance of “integrating” customers, suppliers and internal operations together and, as such, the “Martini Merger” can be considered a pre-cursor to the “arch of integration” concept. The concept of Supply Chain Management is very much based on the operational integration of networked companies. As *Pagell* so succinctly summarized it: “In its essence the entire concept of supply chain management is really predicated on integration.”³ From the early 2000s this area of research experienced significant growth;⁴ the number of papers published on this topic per year went from less than a dozen to more than 200 in 2010.

¹ VASTAG, Gyula (2000): The theory of performance frontiers. *Journal of Operations Management*, Vol. 18, No. 3. 359.

² VASTAG, Gyula – WHYBARK, D. Clay (1991): Manufacturing practices: differences that matter. *International Journal of Production Economics*, Vol. 23, Nos. 1–3. 251.

³ PAGELL, Mark (2004): Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. *Journal of Operations Management*, Vol. 22, No. 5. 460.

⁴ VASTAG, Gyula – ANTAL, Á. – TYUKODI, G. – FÜSTÖS, L. – VAN DER VAART, T. (2012): *Ten Years After: Revisiting and Extending the Arcs of Integration Concept of Supply Chain Management*. “Serving the World” 4th

The crown jewel of these papers, the most highly cited publication on supply chain integration, especially in the *Journal of Operations Management*, is made by Markham Frohlich and Roy Westbrook;⁵ they introduced the concept of “arcs of integration”. Frohlich and Westbrook developed a simple, elegant model and tested this model on single-respondent survey data from the 1998 round of the International Manufacturing Strategy Survey (IMSS). The message of the paper was “politically correct”, void of any contextual complications and offered a message that was appealing in its simplicity: integration matters as manufacturers with the broadest arcs of supply chain integration tend to have the highest levels of performance improvements in multiple areas.

However, pushing the concept of Occam’s Razor too far and offering simple explanations for complex phenomena are misleading. *Whitehead* explained this fallacy: “The aim of science is to seek the simplest explanation of complex facts. We are apt to fall into the error of thinking that the facts are simple because simplicity is the goal of our quest. The guiding motto in the life of every natural philosopher should be Seek simplicity and distrust it.”⁶

The mechanisms of integration, the links that connected the companies were the benchmarked best practices that all companies strived to implement. Pushing for best practices, however, was a double-edged sword: a great deal of debate was going on whether best practices provided competitive advantage, or they just served as competitive levellers. While there is evidence that management excellence in one area begets excellence in other areas as well, it has also been observed that there are performance differences that cannot be explained with hard, measurable factors: “There is still a great deal of variance in the data that has been used here. This suggests an obvious need to learn more about country, industry and other classification variables that may help account for the differences. This is especially important since it is clear that some managers are able to extract greater performance from a given set of practices than other managers can. Finding out why should be a high research priority.”⁷

Although the “arcs of integration” concept has never been directly replicated, nor confirmed without reasonable doubt, it generated a stream of papers that used heterogeneous and hard-to-compare measures of different surveys to provide additional empirical evidence and various extensions to this concept. Most of the papers published in the *Journal of Operations Management* about Supply Chain Integration were based on psychometric questionnaires – Likert-type scales – answered by senior managers with various cultural and professional backgrounds and experience levels.

In the meantime, with the revolution in information technology, especially with big data and various tracking technologies, the emphasis has shifted from survey-based data collection to automatic recording of all relevant physical movements and computer transactions.

Data and Methods Matter: They Are the Message

In the survey-based paper of Frohlich and Westbrook, the targeted population was the industrial segment of “*Manufacture of fabricated metal products, machinery and equipment*” (ISIC Division 38). In the paper, the operational definition of the target population, the sampling

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⁵ FROHLICH, Markham T. – WESTBROOK, Roy (2001): Arcs of Integration: An International Study of Supply Chain Strategies. *Journal of Operations Management*, Vol. 19, No. 2. 185–200.

⁶ WHITEHEAD, Alfred North (1919): *The Concept of Nature*. The Turner Lectures Delivered in Trinity College, November 1919. Release Date: July 16, 2006 [EBook #18835]. 163.

⁷ VASTAG, Gyula – WHYBARK, D. Clay (2005): Inventory management: Is there a knock-on effect? *International Journal of Production Economics*, Vol. 93, No. 1. 137.

frame was not spelled out in detail and no information was provided about the respondent, the unit of analysis and response rates in the targeted country. Frohlich and Westbrook further reduced the IMSS sample of 703 respondents by excluding cases that have “*relatively incomplete reported performance data*” – further muddying the link between any theoretical population and the sub-sample. Consequently, the number of responses in the IMSS sample and in the subsample showed major differences making any generalization of the sub-sample results to any well-defined population highly problematic.

Furthermore, the IMSS data came from 23 countries; the respondents (one from each company) had a variety of backgrounds and professional experiences. Their answers on five-point Likert scales showed a great deal of variance: some used only the middle of the scale, others went more for the extremes. While there are techniques to correct the response tendencies and make the scales more comparable, these techniques were not used in this seminal paper.

In terms of the sophistication and validity of the statistical analysis, it has to be noted that almost 20 years ago there were different standards; the profession just started to use methods of modern data analysis. One potential extension, even today, is to use new methods to squeeze the last bit of information from the data and to provide more context-based extensions and more nuanced messages to the simplistic Arcs of Integration concept.

Social Embeddedness and Causal Ambiguity

We noted the importance of human, soft factors earlier. *Benedek et al.*⁸ proved that social embeddedness – the degree to which economic actors are enmeshed in a social network – has a considerable impact on churn probabilities, which is an outcome or performance measure for mobile telecommunication service providers.

Social embeddedness or social acculturation and its impact on perceived performance can also be grasped in journal rankings: “The perception about the most influential journals is dependent on the field of education, so the perceived journal impact is not an objective category, rather it is interpreted through the many layers of social acculturation, of which education is one factor. We showed that different fields have different referencing practices and authors model their referencing behavior on the established practice within their particular sub-field. Journals that emphasize theory are associated with more references, journals that emphasize practicality have more recent references. This behavior also shows a socialization process; the authors accept and copy unwritten norms in their referencing practices.”⁹

Social embeddedness and social acculturation also show up in the Resource Based View of competitive advantage. In this theory, the firm’s resources serve as “barriers to imitation” and include all assets, operational practices, information and knowledge controlled by the firm. *Barney* gives a precise definition of competitive advantage and sustained competitive advantage: “A firm is said to have a sustained competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy.”¹⁰ A resource to have the potential of sustained competitive advantage must have the *VRIO* attributes: it must be *Valuable* and non-substitutable in the sense it must contribute to a firm capability that has competitive significance and is not easily accomplished through alternative

⁸ BENEDEK, Gábor – LUBLÓY, Ágnes – VASTAG, Gyula (2014): The Importance of Social Embeddedness: Churn Models at Mobile Providers. *Decision Sciences Journal*, Vol. 45, No. 1. 175–201.

⁹ VASTAG, Gyula – MONTABON, Frank (2002): Journal Characteristics, Rankings, and Social Acculturation in Operations Management. *Omega – International Journal of Management Science*, Vol. 30, No. 2. 124.

¹⁰ BARNEY, Jay (1991): Firm Resources and Sustained Competitive Advantage. *Journal of Management*, Vol. 17, No. 1. 102.

means; it must be *Rare* (it is not possessed by a large number of firms) and/or specific to a given firm (the ability of a firm to obtain a resource is dependent upon unique historical conditions); it must be difficult or costly to *Imitate* or replicate because either it is tacit (that is skill-based or people intensive, which makes it causally ambiguous, so it is difficult to understand why one firm consistently outperforms others firms) or socially complex (the resource depends upon large numbers of people or teams engaged in coordinated action such that few individuals, if any, have sufficient breadth of knowledge to grasp the overall phenomenon); and these resources should be *Organized* to capture value.

Beginning with Barney's seminal paper, causal ambiguity has been a focus in strategic management mostly to assess inter-firm causal ambiguity as the source of sustained competitive advantage. However, in intra-firm relations causal ambiguity can lead to difficulties to understand how complex and valuable resources are used efficiently and effectively. This results in the *causal ambiguity paradox*¹¹ saying that inter-firm causal ambiguity increases firm performance because it makes resources harder to imitate by competitors, but at the same time, it also makes it harder for the focal firm's management to use these resources, therefore reducing firm performance. Consequently, there is a trade-off between the positive effects of efficient and effective usage of resources within the firm and the detriments of imitation between firms. The consensus seems to be to strive to reduce causal ambiguity in general, even if it results in facilitated imitability for its competitors, for example, by hiring people from high-performance firms to copy their processes.

Conclusions

Now we are witnessing the demise of surveys as the means of collecting information for analysis. Surveys are replaced by automatically collected and real-time analysed big data (e.g. credit card transactions) and other large data sets (e.g. data from government service centres or patient data from hospitals). In some ways – as American baseball legend and amateur philosopher *Yogi Berra* said – “It's *déjà vu* all over again”: we are witnessing what we experienced at the beginning of the statistical revolution that started with the widespread use of statistical hypothesis tests. Just this time the pendulum swings the other way.

Back then, as *Cohen* put it, we became “Mesmerized by a single all-purpose mechanized ‘objective’ ritual in which we convert numbers and get a yes-no answer, we have come to neglect close scrutiny of where the numbers came from.”¹² Surveys provided an excellent platform for this kind of analysis. Now, it seems, we are going back to closely scrutinizing our data and paying close attention to the contextual factors. Most of the time, we do not need surveys to get the data we need: we have access to in-depth archival data coming from selected companies or we can have automatically collected “big” data to detect patterns. Surveys, being too shallow to be able to grasp and to detect causally ambiguous factors will take the back seat to much larger and more complex data sets better suited for analysing causal and linkage ambiguity that may lead to better insights into sustainable competitive advantage.

¹¹ KING, Adelaide Wilcox (2007): Disentangling Interfirm and Intrafirm Causal Ambiguity: A Conceptual Model of Causal Ambiguity and Sustainable Competitive Advantage. *The Academy of Management Review*, Vol. 32. No. 1.

¹² COHEN, Jacob (1990): Things I have Learned So Far. *American Psychologist*, Vol. 45. No. 12. 1310.

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