BIG DATA – BIG DEAL FOR ORGANIZATION DESIGN?

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Abstract: Analytics is an increasingly important source of competitive advantage. It has even been posited that big data will be the next strategic emphasis of organizations and that analytics capability will be manifested in organizational structure. In this article, I explore how analytics capability might be reflected in organizational structure using the notion of "requisite organization" developed by Jaques (1998). Requisite organization argues that a new strategic emphasis requires the addition of a new stratum in the organization, resulting in greater organizational complexity. Requisite organization could serve as an objective, verifiable criterion for what qualifies as a genuine new strategic emphasis. Such a criterion is necessary for research on the co-evolution of strategy and structure.

Keywords: Big data, organization design, organization structure, structural evolution, strategy and structure, requisite organization

Big data – large sets of data that can be captured, communicated, aggregated, stored, and analyzed – is widely regarded as the next frontier for innovation, competition, and productivity (McKinsey Global Institute, 2011). Davenport and Harris (2006) studied "analytics competitors" – a handful of organizations that have made a commitment to and achieved proficiency in quantitative, fact-based analysis as a competitive differentiator – and noted that those organizations create centralized groups to ensure consistency and data sharing throughout the enterprise and that their shift to analytics is driven from the very top, ideally by the CEO. Galbraith (2012a,b, 2014) posits that big data and analytics may provide a basis for a new structural dimension (in addition to functions, businesses, countries, and customers) that will be "concatenated" (Chandler, 1962) to the organization structures of the future.

My point-of-view article proposes an objective, verifiable criterion for what qualifies as a genuine new strategic dimension such as big data. "Requisite organization," a long-established framework originated by Jaques (1998), is put forward as a yardstick of organizational complexity that pertains to both strategy and structure. Following the requisite organization logic, each concatenation of a strategic dimension would structurally require a new requisite stratum, reflecting a stepwise increase in organizational complexity.

STRUCTURE FOLLOWS STRATEGY

The evolution of organizational structure transpires through a dialectic process of differentiation and integration, with greater differentiation resulting in more organizational complexity (Lawrence & Lorsch, 1967). The pattern of differentiation and integration is manifested in structural adjustments to meet changes in strategy resulting from an expansion of the organization's activities. Chandler (1962) theorized that structural evolution is the cumulative result of several basic strategies, a process he called "concatenation." Each new dimension of organizational structure pertains to a new strategy concatenated to the previous ones. The four basic strategies and respective structures identified by Chandler (1962) are shown in Table 1.

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Table 1. Structure Follows Strategy

Strategy	Structure
Expansion of Volume	An administrative office of a field unit (e.g., plant, sales office) to handle one function in one local area
Geographical Dispersion	A departmental structure and headquarters to administer several local field units
Vertical Integration	A central office to administer multiple departments each of which is responsible for a major function (e.g., manufacturing, sales, research)
Diversification	A general office to administer multiple self-contained divisions

Source: Chandler (1962)

Using the concept of concatenation, Galbraith (2012a,b) describes two more recent strategies, international growth (Stopford & Wells, 1972) and customer focus (Galbraith, 2005, 2010) as well as their structural manifestations. In the case of international growth, the line organization is geographic (typically in the case of B2C enterprises) or based on worldwide business units (typically in the case of R&D-intensive B2B enterprises), with the other dimension being matrixed to the dominant profit center structure. In response to customers' preference to be served through global account units, large global firms such as Walmart, Accenture, and Procter & Gamble have added a fourth dimension to their structure, organizing the "front end" of the value chain by customers. Galbraith (2012a,b) further posits that big data may provide the basis for a new dimension to be concatenated to organization structures of the future. However, he does not specify how a big data strategy will be manifested in an organization's structure.

REQUISITE ORGANIZATION: YARDSTICK OF STRUCTURAL EVOLUTION

In his rigorous conceptual and empirical research that spanned several decades, Jaques (1976, 1998, 2002; Jaques & Cason, 1994; Jaques & Clement, 1991) recognized that organizations exhibit a hierarchical ordering of work complexity that reflects differences in human capability. Role complexity increases discontinuously in specific steps, stratifying different kinds of work into natural layers or "strata." As shown in Table 2, Strata I–IV pertain to the symbolic-verbal order of complexity, embracing activities from day-to-day first-line work to the middle management levels. The conceptual-abstract order of complexity covers Strata V and beyond at the higher management levels, typically in the corporate realm (Jaques, 1998). The major roles at each stratum, along with their time span of discretion, are also shown in Table 2.

Table 2. Requisite Organization

Order of Complexity	Stratum	Role	Time Span of Discretion
Conceptual-Abstract	VIII	Super-corporation CEOs	50+ years
	VII	COOs of large corporations	20–50 years
	VI	Corporate Executive VPs	10–20 years
	V	Business unit Presidents	5–10 years
Symbolic-Verbal	IV	General Managers	2–5 years
	III	Managers of mutual recognition units; senior professionals	1–2 years
	II	First-line managers; professional specialists	3 months to 1 year
	I	First-line manual and clerical workers	1 day to 3 months

Source: Jaques (1998)

Following Jaques (1998), I hypothesize that each structural evolution pertaining to the concatenation of a new strategy requires an additional stratum. Viewed against the backdrop of requisite organization, the strategy of volume expansion can be seen as Stratum III strategy. The corresponding structural response is a field unit in Chandler's (1962) nomenclature, such

as a sales office or retail outlet. The strategy of geographical expansion to larger markets calls for decentralization to a departmental structure. The autonomy of field units begets the crisis of control (Greiner, 1972), where direct control over the organization as a whole is lost. A departmental headquarters (Chandler, 1962) is required at Str-IV to coordinate a number of Str-III units. Management is less direct, and operating decisions are delegated through policy edicts (Scott, 1971). As coordination systems and processes outgrow their original intention and become overly bureaucratic, vertical integration (Chandler, 1962) toward a Str-V structure is needed. The "red-tape crisis" (Greiner, 1972) is resolved through less formal mechanisms such as normative control and interpersonal cooperation. The Str-V structure is a "unified whole system" (Jaques, 1998) that gets its closure in a central office (Chandler, 1962) that integrates different functions into a coherent organizational whole. Diversification strategy (Chandler, 1962) denotes a shift beyond a single Str-V organization. There is no internal solution for further growth, so a diversification strategy moves the firm into new markets and businesses. Chandler (1962) suggests an M-form organization to accommodate diversification, with a general office to administer multiple quasi-autonomous divisions. In terms of requisite organization, this form pertains to a Str-VI corporate structure with Str-V business units.

Extrapolating from the basic strategies identified by Chandler (1962) along the lines suggested by Galbraith (2012a,b), the international growth and customer-focus strategies would denote Str-VII and Str-VIII, respectively, in the requisite organization scheme. Figure 1 exhibits a three-dimensional matrix structure. As described by Galbraith (2010), in Nestlé's matrix structure the businesses and functions report to the country manager and to their respective corporate units forming a three-dimensional matrix. In terms of requisite organization, this structure would be a Str-VII organization with global and local business units at Str-V.

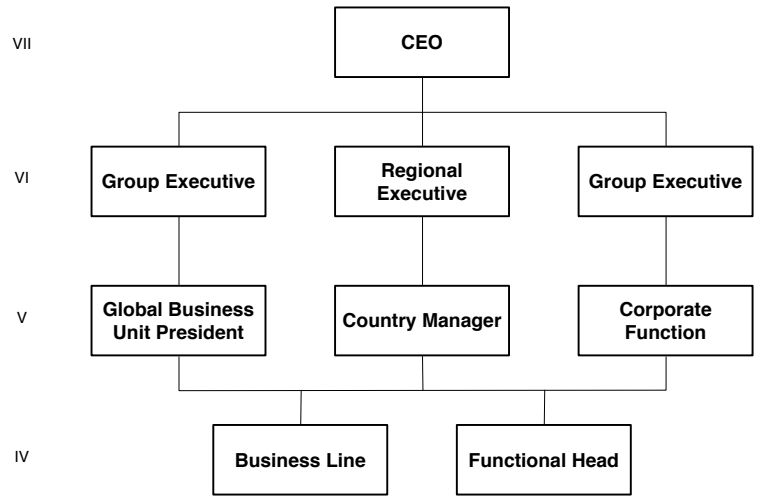

Fig. 1. Str-VII three-dimensional matrix structure

Figure 2 illustrates a four-dimensional matrix structure in which regional units report both to regional teams and to regional heads of the global business units. On the other hand, the regional teams report to both their regional manager and to the customer team. In terms of requisite organization, this structure would be a Str-VIII organization with regional units at Str-III; regional, global, and customer-specific business units at Str-V; a division to back-end and front-end at Str-VII; and the cross-over CEO at Str-VIII. Such a structure is very complex and is only manifested in the largest multinational corporations such as Procter & Gamble (Galbraith, 2010, 2012b).

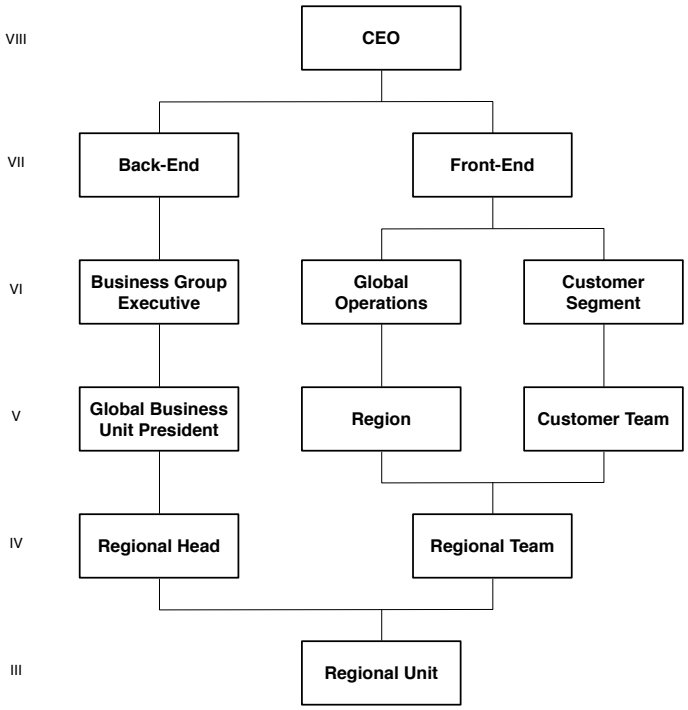

Fig. 2. Str-VIII four-dimensional matrix structure

SO WHAT'S THE BIG DEAL?

Returning to Galbraith's (2012a,b, 2014) contention that big data and analytics would provide a basis for a new structural dimension in organizations of the future, the question naturally arises as to what will be the basic strategy pertaining to big data and how it will be reflected in organizational structure through the concatenation process. While analytics seems to be an important source of competitive advantage, I contend that future concatenation should meet some verifiable, objective criterion. As requisite organization (Jaques, 1998) describes and prescribes the ordering of work complexity in organizations, I suggest that the criterion for concatenation would be that a new stratum is required to incorporate a big data and analytics strategy into the organizational structure. As per my hypothesis, there would then be a litmus test for determining whether big data, indeed, represents a basis for a new strategic dimension. Extrapolating from the observations above, competition on analytics would thereby require a Str-IX structure.

Galbraith (2012b: 10) rightfully asks if new strategic dimensions can be added and embedded in already complex global enterprises: "First, will the growth drivers continue to create additional organizational dimensions as markets, channels, and media become more fragmented and specialized? And, second, can organizations continue to create the integrating mechanisms needed to handle more complex interdependence?" The largest "super-organizations" of the world are at Str-VIII complexity, while Str-IX is concerned with the shaping of societies (Jaques, 1986). Few sources in the work levels literature even refer to strata beyond Str-VII. Ivanov (2013) recognizes the theoretical existence of Str-IX but notes that organizations of this level of complexity have not been found.

Galbraith (2012b) sees inklings of a new structural dimension in the emergence of increasingly substantial analytics units in a few actual organizations. He refers to an anonymous (but real) company whose organizational unit called Decision Analytics provides services for all of the firm's businesses and country organizations. He also considers Nike's Digital Division, responsible for building digital capabilities in other units, as something that may grow to a fifth dimension of strategy and organization (Galbraith, 2014). Just like the third (geographical) dimension grows out of an initial international division (Galbraith, 2010), the fifth dimension may be preceded by such onsets.

Assuming that a new strategic dimension would entail a new requisite stratum, an

extrapolation from three- and four-dimensional structures (as depicted in Figures 1 and 2) might result in something like the organizational structure depicted in Figure 3. As indicated, the enterprise would be divided into the business organization and the analytics organization, the latter "informating" (Zuboff, 1985) the former. This would bring to full life Zuboff's (1985: 9-10) decades-old notion wherein organizations "…recreate their own images in the form of detailed, real-time, integrated databases which give access to internal operations and external business data and can be reflexive enough to organize, summarize, and analyze aspects of their own content."

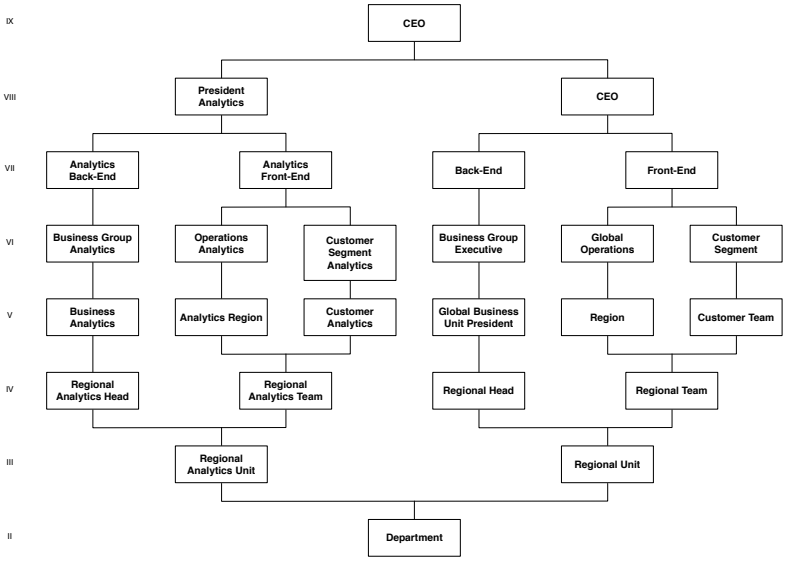

Fig. 3. A hypothetical Str-IX five-dimensional matrix structure

For the sake of argument, the analytics organization in Figure 3 mirrors the business organization (here simply a replica from Figure 2) at all lines and levels. In an actual organization, it would probably not mirror the business organization as closely, but given the predicted exalted role of analytics, one might expect in a five-dimensional structure that business managers at all levels will have peers in the analytics organization. Should an organization of this size and complexity (nine strata and five strategic dimensions) actually emerge, it would indeed be a big deal as no organization of this complexity presently exists.

CONCLUSION

In this point-of-view article, I have addressed the important relationship between organizational strategy and structure. Both Chandler (1962) and Jaques (1998) have shown how a new strategic emphasis is manifested in organizational structure, introducing the concepts of concatenation and requisite organization, respectively. In his various writings, Galbraith has chronicled the new strategic and structural dimensions as they have emerged. Moving forward, organization design scholars can and should use these ideas and concepts to objectively measure and document the evolution of organizational complexity.

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