Interdependence between Structural Engineering and Construction Management
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STRATEGIC SYNERGY OF SERVICE OFFERINGS WITHIN A PROFESSIONAL SERVICES FIRM

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The architecture, engineering, and construction (AEC) industry has traditionally been structured based upon a firm concentrating on select markets and specific service offerings. More recently, however, the industry has moved away from the piece by piece process of developing a project into a more holistic view. This paper suggests the concept that holistic strategies can create positive business synergies. Two types of synergies are identified – synergies related to practice and knowledge and synergies related to service and delivery. Examples of these synergies are provided with cases provided for engineering, architecture, and management firms. The increase in strength of the firm as a result of the strategy is more than the net additive growth or change; hence, it is deemed synergistic. Conclusions identify the synergies outcomes and discuss the need for future research in this area, particularly data-based research to test the theory.

Keywords: Project delivery, Engineering, Architecture, Design, Construction management.

1 INTRODUCTION

The growth of a typical business can have many paths. Much research has been conducted around the concept. The body of research in area does not have a clear consensus on factors that influence firm growth. Gibart's law suggests that firm growth is independent of firm size (Evans 1987). Mansfield (1961) suggests that smaller firms have higher and more variable growth rates than larger ones. Evans, however, found that firm growth decreases with age and with firm size (1987). Other research suggests that rapid and widespread growth among small firms is not to be expected at all. Smaller firms have higher and more variable growth rates than larger ones (O'Farrell and Hitchens 1988). Creating alliances to grow seems to be an established growth practice, however, alliances were found to be created mostly by desire of the firm's management (BarNir and Smith 2002). Competitive advantage is recognized as a key to growth. Dynamic core skills can create competitive advantages and technological learning creates the ability to develop, maintain, and exploit dynamic core competencies (Hitt *et al.* 2000).

Given these varied ideas, a logical question is how best to structure an AEC firm to succeed in today's evolving industry. This paper will introduce the concept of strategic synergies. Strategic synergies is term coined to capture the nonlinear consequences of a strategy. As an example of a non-linear strategy, rather than adding 10 staff to a firm of 10 to create the ability of 20, strategic synergies theorize that the now 20-person firm has the power of more than 20. This power is generated through the synergy of the combination of the parts. This power could be

manifested in many ways. It may mean more revenue (higher professional services billing rates), less competition (greater volume and revenue), or better quality (less rework or write offs). Not every combination, however, will result in such synergy. These following sections will detail examples of two types of synergies – synergies related to practice and knowledge and synergies related to services and delivery.

2 PRACTICE AND KNOWLEDGE BASED SYNERGIES

Practice and knowledge-based synergies are those created by the growth is expertise around a domain of knowledge. Figure 1 shows a typical civil engineering firm on the left side of the figure. The firm may do basic design work related to streets, water transmission, or storm drains. As the firm grows, they would take on more staff with higher levels of expertise. These staff would help the firm win larger projects. As the firm wins larger projects, there influence grows and they can develop more expertise around more sophisticated design work, for example pump stations and water treatment. They may develop sub-specialties, for example reverse osmosis as part of water treatment. Throughout this growth, the firm would use subconsultant designers as needed, depending on the work requirements.

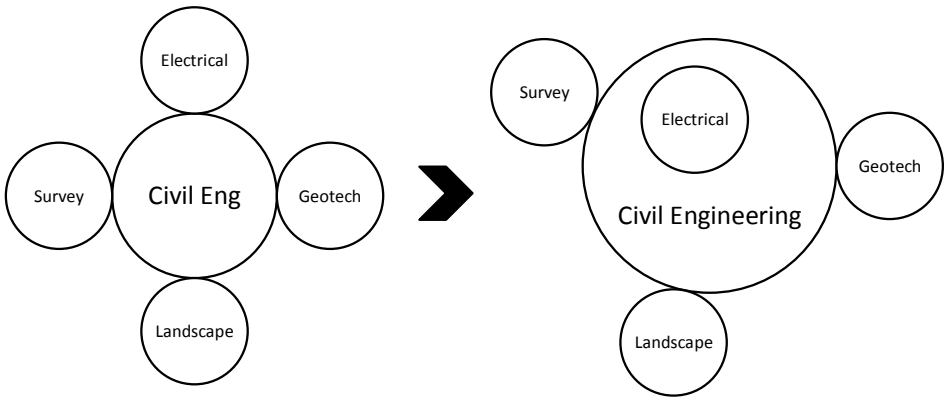

Figure 1. Civil engineering strategic synergy – initial action.

Looking at the right side of Figure 1, a strategic synergy is shown. As the civil engineering design firm grows, one strategy would be to acquire electrical design expertise. This could be done through a group hire or an acquisition. In executing this strategy, the firm will be able to more completely execute a segment of their core work, for example pump station design. By bringing the electrical design in-house, they will be able to present a more competitive fee (no mark up on the sub) and given their office locations and home office structure, they may not need to increase corporate overheard. The synergy of the two design groups working together in the same offices would also improve quality of the design through better coordination. Insurance costs should not be significantly more. Finally, the electrical group could pursue work on their own apart from civil collaborations. This will open up the firm to new clients. Downsides to this action would be the loss of cash for the acquisition and the cultural considerations of bringing on essentially a new team.

This example can advance even more. Figure 2 shows the potential evolution of this strategic synergy. Over time, the firm finds that electrical work is more profitable, perhaps less competitive, and provides better billing rate multipliers. The firm begins to hire more and more electrical designers. Slowly the identity of the firm changes. As less civil design work is won,

the firm concentrates more on electrical work. The firm becomes an engineering firm specializing in in electrical design with a group that could do in-house civil design. As an example, the firm might specialize in power distribution. In this case, the strategic synergy demonstrates a firm better evolved to capture work in their environment. Over time, a nimble firm would experience multiple such evolved actions.

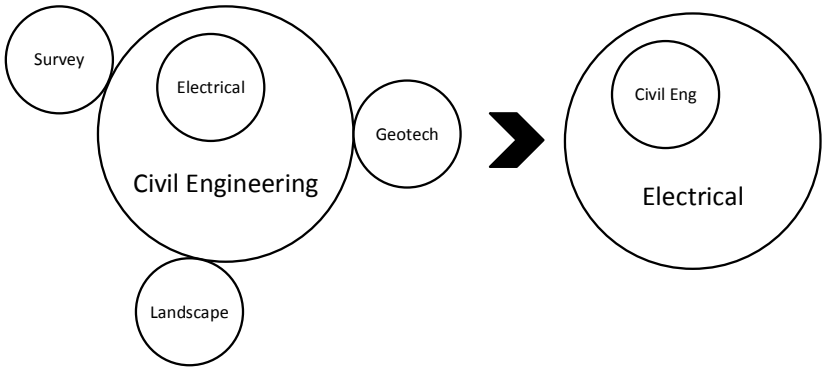

Figure 2. Civil engineering strategic synergy – evolved action.

Similar to the civil engineering design firm, an architecture firm typically uses subconsultants. As shown in Figure 3, in order to design a building project, an architect may team with MEP engineers, structural engineers, civil engineers. As the firm grows, some of this expertise might be brought into the firm. Synergy is created by closer collaboration and immediate access. Creativity is enhanced by shared experiences created by working together and through a better understanding of the architect's vision or style. Efficiency could also be enhanced. For example, unique structural details required to execute one design could potentially be improved and used in future designs.

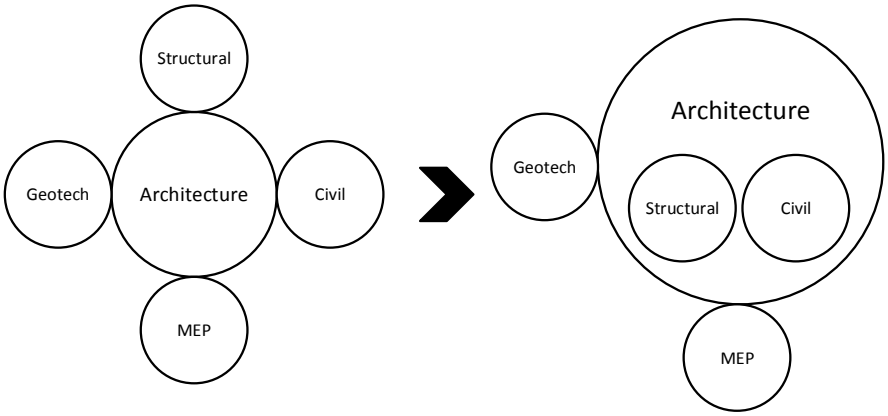

Figure 3. Architecture strategic synergy – initial action.

Eventually, this architecture firm could become a firm with multiple specialties and become a design firm as shown in Figure 4. Each sub specialty could work individually or collaboratively on more complex projects. As the design firm grows, as shown in figure 4, additional specialties can be added. A synergy is created to allow the firm to undertake not only different kinds of

projects, but also projects with different delivery methods (perhaps design-build or a public private partnerships).

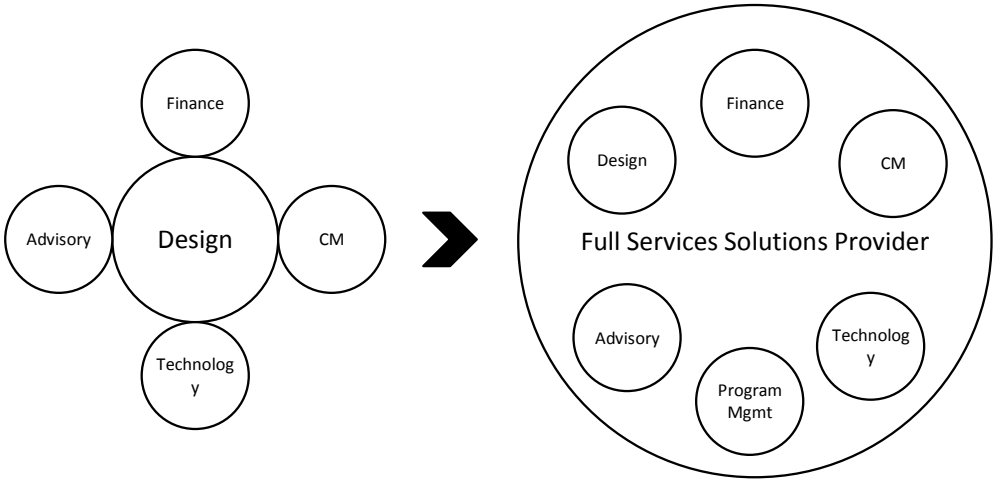

Figure 4. Architecture strategic synergy – evolved action.

In the case of the right side of Figure 4, the increasing expertise of the firm gives synergy related to design efforts, but also potentially synergy related to the types of services across a variety of delivery methods. These are called service and delivery-based synergies.

3 SERVICE AND DELIVERY BASED SYNERGIES

Strategic synergies are not exclusive to design. In fact, many service and delivery based synergies would be related to AEC management organizations. Consider a construction management firm as shown in Figure 5.

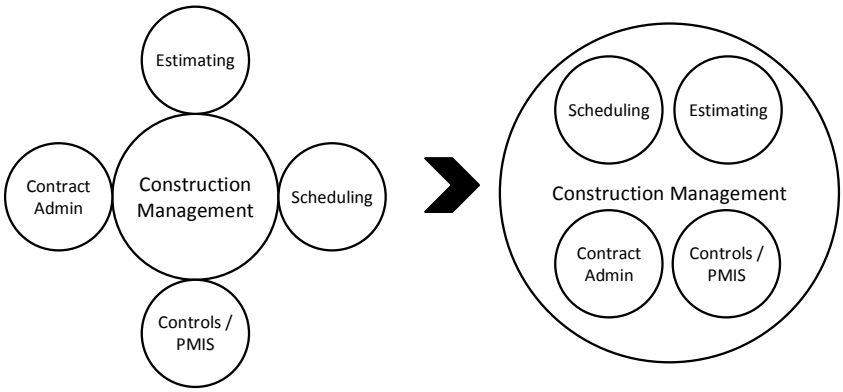

Figure 5. Construction management strategic synergy – initial action.

The firm may start with a few partners who have good connections in the industry and strong core construction expertise. As they advise their clients, depending on the engagement, their scope of work may require technical work related to construction. Examples might be complex

scheduling for a multiple phase industrial project or utilizing strong controls / project management information systems for a program with multiple contractors. In each case, this service would be done through an external subconsultant. Looking at the right side of the diagram, the strategic synergy would bring these services into the firm as the firm grows.

Figures 6 shows how a program a management firm could grow even more. Many construction management firms decide to stay lean, but by developing in house expertise, the firm could now compete and win program management contracts. The synergistic advantage of program management is not related to fee, but rather related to volume. A program manager could have dozens, if not hundreds of staff, billing on a project. This strategy allows the construction management firm to move beyond the billability of its principals, into a role that provides orders of magnitude larger volumes.

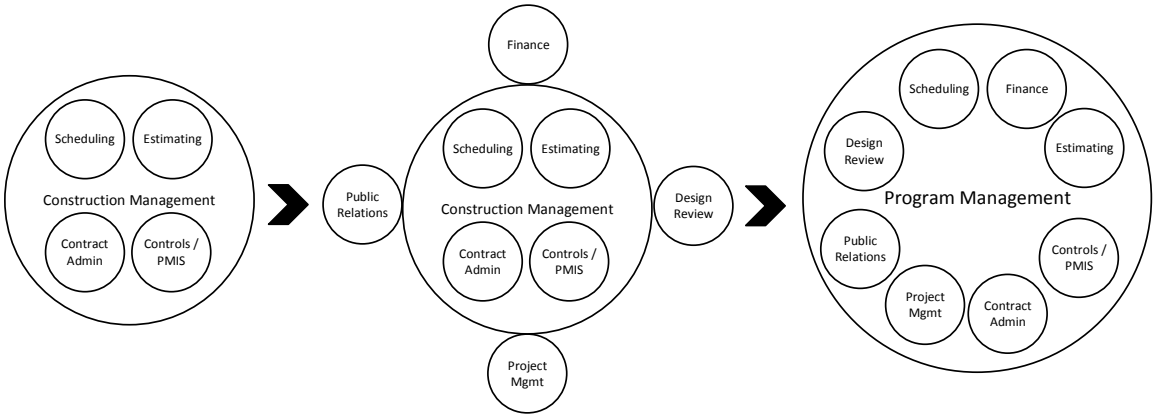

Figure 6. Construction management strategic synergy – evolved action.

Consider the growth in size of a firm on the far-right hand side of Figure 6. Beyond the economics of billable hours, a unique strategic synergy would be created. This firm would start to look less like an AEC firm and more like a solutions provider. The firm could become a large or mega size firm and acquisitions of expertise would become a routine course of business. These firms have very limited competition on huge value programs, very limited competition on their portfolio of expertise, and the ability to generate tremendous fees through there large staffing models.

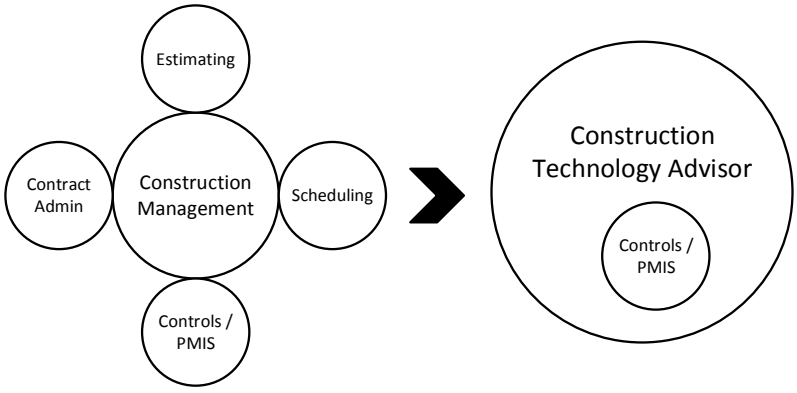

Figure 7. Construction management strategic synergy – evolved specialty action.

Not every service-based strategy needs to entail growth of the firm. Another service based strategic approach might be to specialize the construction management firm from Figure 5 into a single area. One current trend in Construction Management is leveraging technology. Figure 7 shows how a firm might accomplish this by concentrating in the PMIS work. Rather than growing expertise around technical skills associated with construction, like scheduling or estimating, a firm might concentrate on the technology of project management information systems (PMIS) and project controls. This strategy creates a potential synergy in that the firm opens themselves to potentially more types of clients (owners, contractors, suppliers, etc.) and positions them ahead of the technology curve that is pressing forward on construction management.

4 CONCLUSIONS

Based on the above analyses, strategies can be focused in two ways – on a practice / knowledge basis and on a service / delivery basis. This article has summarized examples of each type of strategic synergy. In most cases, immediate benefits can be realized at what is termed evolved actions. In some cases, further potential is identified in secondary evolved actions. These can be manifested through enlarging the size of the effort or concentrating in a specific area. Benefits from the concept of strategic synergy are numerous but focus around increased profitability (from higher fees or larger projects) and / or greater margin (from more specialization / fewer competitors. Benefits can also be manifested through better positioning of the firm for future work and opportunities for employees to advance their careers.

Future research in this area of AEC business strategies is needed. Given the upcoming changes in the industry around technology and technology-based tools, as well as the new project delivery models, sound AEC strategy is critical to a firm's success. Additional research to attempt to quantity the value of these types of synergies needed. Case study-based research with actual financial and performance-based results over long periods of time would be of value for validation of the concepts. Additional conversation and exploration around the theory of strategic synergies would also be of value.

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