✓ Interdisciplinary Conflicts and Resolution as Cultural Behavior Among Architects and Engineers

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This study investigates classical interdisciplinary conflicts and resolutions as cultural behavior occurring between two professions, architects and engineers, whose work contribute immensely to safety and the living conditions of people at large, regardless of culture and nationality. It brings out factors of usual conflicts, classifies them into different categories according to conflict theories and subsequently suggests solutions through conflict resolutions that the author has hoped to be cultural behavior which would work best in the context of Thai society. Data collection is done by using questionnaires. Among the 160 persons sampled, 62 persons are architects and 98 persons are engineers. For resolution as cultural behavior among them, when confronting ***Inadequte Information Supply****, it is rewarding to listen hard with an open mind in order to gain a clear understanding of the assignment, then proceed to work with precisions, hence a desired work quality is plausibly be ensured for all. The study also reveals that* ***Lack of Good Planning*** *is the major factor in organizational conflict working on a building project, on the other hand, the* ***Lack of Aesthetic Sense*** *manifests itself as the major cause for personal conflicts among a good number of engineers and architects with colitary sets of expertise. It suggests that the modification of cultural behavior would make an immence differance if engineers be more open to aesthetics, as architects try harder to comprehend the contradictory mentality over* ***Beauty*** *and* ***Practicality.***

1. Introduction

The realm of practitioners, working interconnectedly to fabricate various types of project, product and service associated to

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our everyday lives, is composed of three major groups (Parker, 2003; Hodgetts, 2001): Functional, Self-Directed and Cross-Functional (or Interdisciplinary). An example a Cross-Functional group's, an advertising team which may include a creative director, an art director, a fashion designer, a copy writer and a special effects expert. An other Cross-Function group is an auto exhibition team that could contain a marketing manager, an exhibition designer, a lighting designer, a structural engineer and an electrical engineer.

One of the most important Cross-Functional groups is building practitioners. This study focuses on building practitioners, specifically architects and engineers including practitioners of all concentrations within: architects of general practice, interior architects, landscape architects and lighting designers; structural engineers, mechanical engineers and electrical engineers.

Since Cross-Functional groups come from different training backgrounds with different sets of expertise, work pattern, mindset and so on (Belbin, 2004), there is a great deal of possibility for conflict to take place when coming to work together (Chiberg, 1991). The study looks into conflict factors especially over communications, organization and personal variables. It discusses effective resolutions in search of efficient ways for the two categories of professionals to work together on delivering quality products of various building categories from residential to commercial, industrial to recreational, all of which would have significant impacts on our safety and livelihoods in general.

All conflicts are flipped sides of the same coin. While some conflicts result in poor quality of the end product, resource and time loss, others may turn out to be creative as the two try to find solutions and take each other's perspectives into consideration then come up with something even better than the original. All these can be considerered as cultural behavior among architects and engineers.

2. Background

2.1 Conflict Factors

Conflict factors can been divided into three major groups (Robbins, 1983): communication conflict, organization conflict and personal variable.

2.1.1 Communication Conflict involves the following factors: Terminology Misinterpretation, Inattentiveness and Inadequate Information Supply.

(a) Terminology Misinterpretation

Among various issues concerning work conflicts between architects and engineers working together on building projects, huge or small, from houses to skyscrapers, the causes are oftentimes boiled down into the misinterpretations of terminologies used to communicate among these two groups of people both in verbal language and drawings (Robson, 1997; LeMessurier, 1991). Symbols, signs and terms in architectural and engineering drawings mean different things (Browning, 1996). The fact is that both use their drawings as language to communicate not less extensively than verbal languages (Levinson, 1994).

(b) Inattentiveness

Inattentiveness leads to misunderstanding. If one is forced to listen to an unfamiliar language for a while, as ambiguity accumulates, he tends to loose attention. To get the message across, the speaker probably needs to put more effort on seeking to establish a common ground of understanding, which involves assisting the other to overcome such a barrier.

(c) Inadequate Information Supply:

Concerning architecture drawing, terminology ambiguity such as the word "move" next to a circle around the door marked by an architect could mean: "just move the door to..", "demolish and move", or if the circle accidentally covers the wall and a post nearby. An

unpleasant result could be "All in the circle demolished and moved" (Duggar, 1984). Such a perplexity could have been avoided by supplying a detailed clarification of what work exactly needed to be done. The architect should have stated it clearly and the engineers should have asked to confirm. Yet in reality, both sides often work on a hectic schedule and hardly have enough time to go over small to medium modifications (Stitt, 1994).

2.1.2 Organization Conflict Involving the Following Factors: Missing of Integrator, Lack of Good Planning and Overlapping Responsibility.

(a) Missing of Integrator:

An integrator is a person with knowledge or training in both fields. His educational background coupled with work experience enables him to assist in conflict mitigation, bridging the gap between the divided descriptions. His multiple layers of perspective give him insights into views of both the architects and the engineers. He performs the role of conciliator, messenger and trouble shooter at the same time, thus, an ideal liaison (Rush, 1986; Wilkinson, 2002).

(b) Lack of Good Planning:

As building projects get complicated, they require experts in various fields to get involved (Gray, 2001). To avoid chaotic consequences, good planning is a requisite. Good planning refers to sensible work sequence, clear areas of responsibility on all positions with distinct definitions on chains of command, lines of duty, priority, finite timelines and so on. Failure to practice good planning usually results in a domino effect on team members both vertically and horizontally.

(c) Overlapping Responsibility:

Overlapping responsibility is the direct consequence from position mistake. When areas of responsibility are not clearly defined, people either take the matter into their own hands or deliberately exercise discretion. Such ambiguities and confusions are the breeding ground for negative interface between referenced

groups of opposite descriptions.

2.1.3 Personal Variables Involving the Following Factors: Lack of Aesthetic Sense, Alienation and Discrimination and Lifestyle Diversion.

(a) Lack of Aesthetic Sense:

Beauty is an essence of aesthetics in all civilizations. As architects are trained to develop their aesthetic sense and culture considerations, engineeringís emphasis is primarily on how to make things work in cost-efficient manners (Macdonald, 2001; Maylor, 1999). Trouble starts when the engineer views an architecturally designed item as excessive and unnecessary, while the architect insists that the motif remains consistent for the entire building in accordance to the project theme (Schlaich, 1991).

An example of public communal waterways turned strictly to be means for water supply systems demonstrates clearly how the beauty of traditional way of life has virtually vanished by such a lack of aesthetic sense (Orton, 1993). This mundane daily vision of concrete pipes running along the continuous water network is probably not so bothersome until one comes to realize that it could have been done better with a more serious consideration on the beauty of traditional Thai means of commuting extensively on those intricate water enclaves. The nostalgic pictures and images of people travelling and merchandizing on boats could have been saved and sustained if only the retaining walls on the canal banks were built to secure soil erosions.

(b) Alienation and Discrimination:

Why does it come so naturally for people to form the sense of alienation and discrimination against those from the opposite side of the spectrum? The answer is rather anthropological, ignorance and primal fear for difference. Blacks opposing whites, religions against religions, natives counter tribes, and the list goes on (Johnson, 1996). We tend to identify ourselves with those of identical qualities on various aspects. We feel more comfortable and secure to hang out

with colleagues who graduated from the same institution, even feel fond of those familiar faces in the school year book (Hecht, 1998). There are more in common among us than those from else where not to mention faraway fields of study such as culinary arts and medical science, literature and computer technology, cinematography and nutritional science, etc. While architecture and engineering do not seem to be such a distance from each other in terms of goal, yet when it comes to cooperation, the level of misapprehension is relatively astonishing.

(c) Lifestyle Diversion:

Years of training added up with work experience in a specific field makes up who we are as professionals (Levy, 1980). Certain patterns of thinking, sets of values, tastes and lifestyles had been formed in the process. Dissimilarities of such are the foundation of the divergent perspectives and approaches to the same issues.

In addition, architects and engineers appear to bare disparities in language and culture. Interestingly enough, same words could mean different things, i.e, 'wide' in rough measurement for an engineer is 1 meter, yet for an architect is 1.5 meter, which is slightly wider; when requesting 'natural material', an architect implies 'wooden' while an engineer perceives it as rock, sand, wood, things of that nature; 'heavy' in engineering perception is great weight or high density, but it entails a mere massive and cumbersome look on the architectural side.

Dissent over beauty and practicality are common among the cited groups. For an architect, 'hall space' is equivalent to 'room for breath'. In order to serve that purpose properly, it ought to be rather spacious (Licklider, 1989). For an engineer, air is available for breath in all rooms, it doesnít make any difference whether this hall exists or not. It is almost forbidden from an architectural point of view to let any gutter be imposed on the building facade; antennas and gadgets should be kept out of sight as well.

2.2 Conflict Resolutions

In his classic work entitled "Handbook of Industrial and Organization Psychology", 1976, Thomas Kenneth suggests conflict resolution styles as follows:

(a) Competing: The idea is to win over the other in order to gain absolute authority.

(b) Accommodating: For the sake of cohesion, one would be attuned to the opposition.

(c) Collaborating: It is the approach which aims at a result of win-win situation.

(d) Avoiding: Avoiding is related to an attitude of not to confront, rather ignore and hold off on addressing the problem.

(e) Compromising: As a conflict sets in, both seek to establish common ground.

2.3 Self Theories

According to Stephen Littlejohn's "Theories of Human Communication", 1996, the Theories of Self involves three elements: Self Consciousness, Agency, Autobiography. The only element that we are interested in here is Self Consciousness: as a person thinks of himself as an object, he thinks and talks about himself, hence the reflection of awareness.

Sense of being aware is the very essence that enables a person to differentiate right from wrong. Yet knowing right from wrong is one thing, what to do is another (Van Slyke, 1999). Whether a person decides to do it right, depends upon his judgement, which is another separate mechanism of the decision making process. That is to say, his decision to do the right thing originates first in his awareness before being processed through good judgement.

For example, architects design the building and set the beam as a small size. After calculation by engineers, these beams have to be enlarged. If architects are afraid to lose face they will not allow the

beam to be changed. Their awareness is wrong and also it is not a good judgement.

In a not less radical situation of architect- engineer related conflict, when an architect is aware of his invalid design on building column dimensions, yet decides to confirm its validity and insists all to proceed accordingly, the result could be equally tragic.

2.4 Coordination of Architects and Engineers

Building projects are assembly of any construction and infrastructure on a site. Although this may be thought of as a single activity, in fact it is a feat of multitasking. Normally the job is managed by the construction manager, supervised by the project manager, design engineer or project architect (Bunch, 1992; Levy, 1980). While these people work in offices and occasionally on sites, every construction project requires a large number of labourers, carpenters, masons and other skilled tradesmen to complete the physical tasks of construction.

For the successful execution of a project, effective coordination is essential. To trace back the evolution of coordination between architects and engineers, the development of skyscrapers specifically in Chicago shall be brought into the picture for an extensive discussion, the reason being that the complexity of such a building type requires an emphatically, humorously speaking, devoted confederation from our dual focused descriptions.

The crucial developments for modern skyscrapers were steel, glass, reinforced concrete, water pumps and elevators. Until the 19th century, buildings of over six stories were rare. So many flights of stairs were impractical for inhabitants, and water pressure was usually insufficient to supply running water above 15 meters. Concerns over aesthetics and fires safety had likewise hampered the development of skyscrapers across continental Europe for the first half of the century.

Chicago's skyline was not allowed to grow until height limits

were relaxed in 1960; over the next 15 years, many towers were built, including the massive 442 meter landmark record of the city. Today, skyscrapers are an increasingly common sight, especially where land is scarce, as in the heart of the city, because of the high ratio of rentable floor space per area of land. Some of those remarkable buildings are considered symbols of the city's economic power.

It was no mere accident that in the 1880s, Chicago produced a group of architects, now known as the "First Chicago School," whose work would have a profound effect upon architecture. The urban crisis in the 1960s would inspire the Chicago School to experiment with technical innovations as tall buildings were getting more and more complex and be of great demand amidst urban sprawls and skyrocketting land values (Charoenpat, 1999; Pfammatter, 2000).

Simultaneously, better construction and engineering technology became available as the century progressed, Building Systems Integration has been initiated (Rush, 1986). Retailing could now be the place where tall office buildings would be perfected.

Building Systems Integration as an intergrated solution results from a methodical design approach that considers the cha-racteristics and properties of each system or product, its role in the greater whole of the design and its needs for installation, coordination with other building systems and operational maintenance with servicability (Vanishsiriroj, 2000; Wilkinson, 2002; Rush, 1986). For instance, the selection of a ceiling light fixture bears implications that ought to be considered in terms of lights as well as energy used, heat, noise and radiation (Oberlender, 1993). The greatest merit of this innovation is notably being that it sheds light on design concepts that meet functional needs, integral relationship of form and function, design solutions that fully integrate products or systems and lastly on how the facility will be operated and maintained. It is, indeed, the incorporation of Beauty and Utility, so to speak. The underlying concept is to create a unified whole that achieves both the desired design and functional purpose.

3. Methodology

The research method used to collect data to test hypotheses is Likert scale questionnaires, with a range of 1 to 5, interpreted as "the least to the most". Data analysis scheme is based on t-test.

Hypothesis 1:

The cause of conflict is primarily addressed, and then both the architect and engineer have the same opinion.

Hypothesis 2:

This hypothesis involves awareness and judgement. Thus, conflict resolution style is not different even with right or wrong feelings.

4. Findings

To prove the entire hypotheses in this study, a group of 62 architects and 98 engineers have been questioned regarding to what level the cited factors are considered as major conflict.

1) The analysis for factor: Terminology Misinterpretation. The results are: mean = 2.01, SD = 0.79(architects group); mean = 2.01, SD = 0.80(engineers group), t = 0.04. The result indicates insignificant difference between the two groups. Hypothesis is accepted.

2) The analysis for factor: Inattentiveness, the results are: mean = 2.41, SD = 1.27(architects group); mean = 2.37, SD = 1.23 (engineers group), t = 0.20. This indicates the equal greatness of impact from such conflict factor among the two groups. Hypothesis is accepted.

3) The analysis for factor: Inadequate Information Supply, the results are: mean = 3.12, SD = 1.07(architects group); mean = 3.12, SD = 1.05(engineers group), t = 0.03. It manifests insignificant difference between the two. Hypothesis is accepted.

4) The analysis for factor: Missing of Integrator, the results are: mean = 2.45. SD = 1.11(architects group); mean = 2.51, SD = 1.07 (engineers group), t = -0.32. It implies that both moderately

share the same view that the integrator is necessary to ease miscommunications. Hypothesis is accepted.

5) The analysis for factor: Lack of Good Planning, the results are: mean = 2.56, SD = 1.30(architects group); mean = 2.63, SD = 1.29(engineers group), t = 0.32. It shows that both strongly agree that Lack of Good Planning contribute to problematic consequence. Hypothesis is accepted.

6) The analysis for factor: Overlapping Responsibility, the results are: mean = 2.04, SD = 0.93(architects group); mean = 2.05, SD = 0.92(engineers group), t = -0.01. This conflict factor is insignificant. Hypothesis is accepted.

7) The analysis for factor: Lack of Aesthetic Appreciation: the results are: mean = 3.19, SD = 1.34 (architects group); mean = 3.10, SD = 1.23(engineers group), t = 0.43. The majority views this as a main conflict factor. Hypothesis is accepted.

8) The analysis for factor: Alienation: the results are: mean = 2.32, SD = 1.41(architects group); mean = 2.37, SD = 1.39 (engineers group), t = -0.24. Hypothesis is accepted.

9) The analysis for factor: Lifestyle and Taste Difference: mean = 2.58, SD = 1.27(architects group); mean = 2.48, SD = 1.18(engineers group), t = 0.15. Hypothesis is accepted.

10) The analysis of the data reveals that the style is as following: Accommodating, Collaborating, Avoiding and Compromising. Hypotheses are accepted. Only one style- Competing, hypothesis is denied.

11) Regarding Individual Conscious over right and wrong, the two groups mutually agree that Collaborating approach tends to work best in most situations.

12) Related with Competing, the study also reveals that trying to win over while realizing it is wrong, the work quality suffers in different degrees depending on magnitudes. The results correspond to one another.

5. Discussions

The analysis of the communication conflict found that 3.12 is the highest mean value indicating the most significant conflict factor, which is Inadequate Information Supply (Avery , 2001). The solution for this is ways and means to improve quality and quantity of information supply from both ends (Parker, 2003).

In Thailand, hardly any project either has an access to a properly trained Integrator or accords emphasis to the significance of this key person. Perhaps the realization of how great the project would benefit from his role ought to be enunciated first, then the urge to establish such a position will follow causing the supply side to satisfy such a market demand, hence more graduates of cross-training background (Wilkinson, 2002).

For the Organizational Conflict: Lack of Good Planning leads to chaos on the building process (Hinze, 1998). It sometimes becomes the number one conflict factor

Overlapping Responsibility has littered weight because not many projects have overlapping positions.

Concerning Individual Variables: Lack of Aesthetic Appreciation scores the highest (mean = 3.19) meaning. It is the major conflict factor that happens mostly on the engineer side (Francastel, 2000).

The hypothesis formed in this study is based fundamentally on the principal work of Thomas Kenneth's "Conflict Resolution Styles" (Fox, 2002; Tuner, 1983; Thomas, 1976) reflecting upon individual's conscious over decisions on various resolution approaches (Van Slyke, 1999).

The research result clearly indicates that Collaborating is the approach that works best practically in most situations (Wasserman, 2000). On the contrary, Competing is the least effective approach especially when the one who tries to win- over is wrong (Levinson & Brown, 1994). Competing works only when people need to get involved and elicit information.

6. Conclusions

Collaborating has proved to be the most effective approach to resolve conflicts between Cross-Functional groups: architects and engineers, whose general characters perpetuate a great deal of solitary expertise. For resolution as cultural behaviour among them, when confronting Inadequate Information Supply, it is rewarding to listen hard with an open mind in order to gain a clear understanding of the assignment, then proceed to work with precisions, hence a desired work quality is plausibly ensured for all.

In organizational conflict, Lack of Good Planning scores the highest, the meaning of which is that it is the major factor to be taken into consideration when trying to overcome conflicts.

Within the personal variables, the Lack of Aesthetic Sense is the biggest factor. Toward modification of cultural behaviour, engineers ought to learn more about aesthetic, beauty or at least, to leave room for the aesthetics issues.

Competing works only when the validity is definite, the end result could be relatively unpleasant otherwise.

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