Applying Leadership Models in the Cockpit

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Introduction

Leadership in aviation may be decomposed into two important domain levels; the broader organizational level and the more narrowly focused flight deck (pilot) level. While the organizational level shares responsibility for both profit and safety, the primary responsibility for pilots is safety (not to discount the fact that just one unsafe act committed by the pilot can negatively influence at least short-term profits).

In its most succinct form, leadership can be defined as, "A special case of interpersonal influence that gets an individual or group to do what the leader wants done" (Schermerhorn, Hunt, & Osborn, 2003, pp. G-7). Extensive research has been conducted on leadership and the literature abounds with theories and theoretical models. One such model is known as *transformational leadership*. This paper will focus on this model as it applies to aviation, a safety-sensitive industry. Multicultural issues, as well as comparative theories, will also be explored to see if there might be more efficacious leadership styles that can be used in this domain.

What is Transformational Leadership?

Transformational leadership, by definition, "Occurs when leaders broaden and elevate followers' interests and followers look beyond their own interests for the good of others" (pp. G-12). Transformational leadership contains four components; charisma or idealized influence

(attributed or behavioral), inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1985, as cited in Bass & Steidlmeier, 1999). These items were developed empirically in studies that asked people to describe the best leaders they know (Bass & Avolio, 1990, as cited in Brehm, Kassin, & Fein, 2002). The results are illustrated below:

1. Charisma- Has a vision; gains respect, trust, and confidence; promotes a strong identification of followers.
2. Inspiration- Gives pep talks, increases optimism and enthusiasm, and arouses emotion in communications.
3. Intellectual Stimulation- actively encourages a re-examination of existing values and assumptions; fosters creativity and the use of intelligence.
4. Individualized Consideration- Gives personal attention to all members, acts as advisor and gives feedback in ways that are easy to accept, understand, and use for personal development.

(Adapted from Bass & Avolio, 1990, as cited in Brehm, Kassin, & Fein, 2002).

A transformational leader will motivate followers to do more than they are originally expected to do, and in return the followers will feel trust, admiration, loyalty, and respect toward the leader (Yukl, 2002, p. 253). According to Bass (1985, as cited in Yukl, 2002), "The leader transforms and motivates followers by (a) making them more aware of the importance of task outcomes, (b) inducing them to transcend their own self-interest for the sake of the organization or team, and (c) activating their higher-order needs." While this type of leadership style promotes motivation by employee empowerment, the closely related transactional approach works more on

a 'this for that' basis. For instance, in a transactional approach, leaders provide praise and rewards for a job well done while less than adequate performance is associated with negative feedback, reproof, threats, or disciplinary actions (Bass & Steidlmeier, 1999). This type of continuous-loop process can be tied to the behavioral approach with the hope that positive behaviors are reinforced while negative behaviors are diminished or extinguished.

Research on transformational leadership has been brisk since the seminal work of House (1977) and Burns (1978). In a longitudinal study by Keller (2006), it was found that transformational leadership predicted 1-year-later technical quality, schedule performance, and cost performance and 5-year-later profitability and speed to market. Moderator effects for type of R&D work were hypothesized and found whereby transformational leadership was a stronger predictor of technical quality in research projects, whereas initiating structure was a stronger predictor of technical quality in development projects (p. 202).

A two-part study conducted by Barling, Loughlin, and Kelloway (2002) suggests that transformational leadership can have an ameliorating affect on on-the-job injuries. The first part of their study found that safety-specific transformational leadership predicted occupational injuries through the effects of perceived safety climate, safety consciousness, and safety-related events. The second part of their study found that safety-specific transformational leadership and role overload were related to occupational injuries through the effects of perceived safety climate, safety consciousness, and safety-related events (p. 488). It should be noted that Barling and colleagues' sample population was limited to the food and beverage industry and may or not be generalizable to more safety-sensitive industries, such as aviation.

Another, similar study, by Zohar (2002) focused more precisely on a safety-sensitive industry. Participants were selected from a regional maintenance center specializing in repair and

upgrading of heavy-duty equipment. A leadership-intervention model was developed to modify supervisory monitoring and rewarding of subordinates' safety performance. Safety interactions were conducted on a weekly basis between line supervisors and subordinates, which included the reinforcement of a 'safety over speed and schedule' concept. Safety-oriented interaction increased significantly in the experimental groups but remained unchanged in the control groups. This change in safety-oriented interaction was accompanied by significant (and stable) changes in minor injury rate, earplug use, and safety climate scores during the postintervention period (p. 156).

The above study, while not necessarily linked to transformational leadership, still supports the general theory. By fostering a caring, committed, and concerned environment for worker safety, leaders were able to attain positive results by gaining the respect of their subordinates in a structured and quantifiable manner. The transactional component is apparent in that leaders will give subordinates a safer working environment if the subordinates will listen to what the leaders have to say. Constant reinforcement will help to ensure that these behaviors remain active. Unfortunately, many of the best safety programs start with a 'big bang' and wind up fading away due to lack of reinforcement or interest. A proactive approach to safety is underscored by the transformational leadership model. In aviation, a proactive approach is the most effective way of preventing incidents and accidents. Unfortunately, due to managerial myopia, economics, or a combination of both, many aviation companies take a reactive approach to safety and "only fix things when they are broken."

Leadership in the Cockpit

Based on the previously cited studies, it appears that transformational leadership can be a very effective form of leading. From an organization standpoint, and particularly among work teams and groups, this author supports this model. But the question remains as to whether this model would work as well in the confines of an airplane cockpit with only two crewmembers. Attention also needs to be paid to the interaction between pilots and flight attendants. The primary responsibility for both of these groups is to ensure passenger safety. However, research as shown that these two disparate groups do not always work as a cohesive team, especially when in abnormal or emergency situations (Chute & Wiener, 1995).

There has been a perpetual debate on whether leaders are born or made. Some believe that being an effective leader is an inherent quality present at birth. Others, including this author, argue that leadership skills are developed over time; people continually develop and grow as a byproduct of experience and situations. Either way, some studies have indicated that between 60% and 75% of the managers in America are not effective managers (Hogan, Raskin, & Fazzini, 1990, as cited in Pettitt & Dunlap, 1995). Pettitt and Dunlap (1995) contend that this statistic can be transferable to the management of cockpits by pilots. If this theory holds true, this is certainly sobering and unacceptable.

The FAA has addressed, among other topics, leadership and followership through its crew resource management (CRM) training advisory circular 120-51E (FAA, 2004). This circular provides guidance for CRM trainers by addressing the 'behavioral markers' that influence effective leadership and followership skills. Although the circular is advisory in nature, and is well-intentioned, this author opines that the topic is covered in too cursory of a manner

and should be expanded upon to include a better elucidation of leadership theories and team dynamics. Simply stated, a CRM trainer should have a better understanding of leadership before judging others' ability to lead.

> "I just finished a trip with the most unprofessional, non standard, weak and violation-prone captain at my air carrier, on a 13 day intra-Asia flight. I must have caught 30 or more of his mistakes. If I missed some, it was because I was getting yelled at. The whole trip he tried to get me to quit, but I didn't. On the 12th day, he tried to get off the trip, but the company didn't let him. We are both under company review. This man is a menace to aviation and an accident waiting to happen." (NASA ASRS Accession # 603942).

The above, anonymously reported incident illuminates the potential problems with cockpit leadership. This actual report was included for the purpose of elucidating the most extreme of cockpit leadership deficiencies. It is by no means a representative example of typical, everyday operations. However, it does raise the question of how this captain “slipped through the hoops” or later became this way as a result of job bitterness or complacency. It is plainly obvious that there is a growing need to better understand the concepts and theories behind cockpit leadership behaviors and, most importantly, how to export those behaviors into the practical environment.

Transformational Leadership and Multicultural Issues

The effective use of transformational leadership in a multicultural crew environment may be confounded by a number of issues. Some of these issues are pervasive in everyday flight operations while others are more culture-specific. For instance, when a [same-culture] captain and copilot are paired (some pairs may have never flown together previously) there will be a normal, fundamental, flow-down hierarchy. According to Milanovich, Driskell, Stout, and Salas (1998), "One of the most troublesome dynamics evident in the airplane cockpit is related to patterns of authority relations between the captain and first officer: Too often, captains fail to listen and first officers fail to speak." The authors propound that this is the effect of *status generalization,* or a team dynamic that develops wherein the captain tends to reject input from the first officer and the first officer is hesitant to question the captain (p.155). Status generalization in and of itself can be a problem, but throw in a crew with contrasting cultural backgrounds and things can get even more interesting.

A study by Helmreich, Wilhelm, Klinect, and Merritt (2001) explored the effects of national culture in aviation by using Hofstede's (1980, 1991) four dimensional model as an anchor. They looked at three of the four dimensions: Power Distance, Individualism-Collectivism, and Uncertainty Avoidance. Space does not allow for the results of all the dimensions but the Power Distance (PD) results are worthy of discussion here. They found that countries such as Morocco, the Philippines, Taiwan, and Brazil scored the highest on the PD scale, indicating that these countries had the highest acceptance of unequally distributed power. On the other end of the continuum they found that countries such as Ireland, Denmark, Norway, and the USA scored at the low end of the distribution, indicating a lower PD and thus more acceptance of equal power distribution.

Another culturally-based study, on flight deck automation attitudes, was conducted by Sherman, Helmreich, and Merritt (1997). In their sample of 5,879 airline pilots from 12 nations they found that the average difference in endorsement levels across 11 items for pilots flying automated aircraft was 53%, reflecting significant national differences in attitudes on all items, with the largest difference observed for preference and enthusiasm for automation (p. 311).

What does all of this mean for leadership in multicultural cockpit? It means that there are a number of potential problems stemming mostly from one's cultural views on authority. While some cultures foster a flatter leader-follower hierarchy (i.e., the United States), other cultures support a distinct vertical structure of authority, replete with an overabundance of respect and deference to the leader (i.e., Brazil). This begs to ask the question of how safe it would be to pair a captain from the United States with a copilot from a country such as Brazil? Would transformational leadership be effective in this situation? This author opines that the answer is no. While transformational leadership may be effective within a culture that promotes a flatter hierarchy, it would not appear to be as efficacious in a mixed-culture cockpit. In fact, the whole concept of transformational leadership could be undermined by the cultural determinants inherent in the Brazilian copilot. Would the captain's charisma, trust, and sincere concern for the copilot truly change the copilot's approach to followership by speaking up, providing input, and possibly challenging a captain's decision? It would appear that this issue is dichotomic; the copilot's culture is in contrast with the very principles that are required for safe and effective cockpit teamwork.

Alternative Leadership Models

There are three other models that could be considered for effective leadership in the cockpit. The first model is *participative leadership*. In participative leadership, various decision procedures are used to allow other people some influence over the leader's decisions (Yukl, 2002, p. 81). This type of leadership style can be highly effective in a two-person team (such as those found in modern cockpits) where the exchange of information, especially during high workload, is critical. In fact, one of the major goals of CRM training is to teach copilots (who are acting in a subordinate role) to speak up and provide required information at the proper time. The use of a participative leadership style by a captain can allow the steep hierarchical gradient, or trans-cockpit authority (Hawkins, 1993), to be broken down by working on more of a shared level. This is not always as easy as it sounds, as the distinction between leadership and authority can sometimes be blurred. Authority is normally assigned while leadership is acquired and suggests a voluntary following (pp. 146-147).

In comparison to transformational leadership, participative leadership differs in one major way. Whereas transformational leadership concentrates on more of a charismatic approach with solid reinforcement for good behaviors by the superordinate, participative leadership focuses on an equal distribution of decision input; a virtue that is highly important in an unforgiving environment such as flight, which requires a multiplicity of complex decisions. It should be noted that although participative leadership alludes to an equal sharing of decision information from the captain and copilot, the captain is still the pilot in command of the flight and thus makes the final decisions.

The second alternative model is called *situational leadership.* Within this category, the focus will be on the *normative decision model* posited by Vroom and Yetton (1973). This model

recommends an appropriate level of employee participation based on an analysis of several situational attributes (Parker, 1999). Within this model there are five decision procedures, including two varieties of autocratic decision (AI and AII), two varieties of consultation (CI and CII), and one variety of joint decision making by leader and subordinates as a group (GII) (Vroom & Yetton, 1973) The situational variables include the following:

1. The amount of relevant information possessed by leader and subordinates.
2. The likelihood that subordinates will accept and autocratic decision.
3. The likelihood that subordinates will cooperate if allowed to participate.
4. The amount of disagreement among subordinates with respect to their preferred alternatives.
5. The extent to which the decision problem is unstructured and requires creative problem solving.

(Adapted from Yukl, 2002, pp. 89)

Situational leadership differs from the transformational model in that instead of seeking to transform subordinates into getting the job done effectively (or improving safety, in this case) the situational leader will consider the situational variables and then derive a decision after weighing the alternatives. This type of decision process can decrease the possibility of Satisficing, which attempts to achieve at least some minimum level of a particular variable, but which does not strive to achieve its maximum possible value (Simon, 1957). The limitation to this leadership model is that it is more applicable to multiple subordinates and may or may not be as effective in a two crew (captain and copilot) situation.

That being said, it would appear that situational leadership could be effective in the cockpit. One of the primary jobs of the copilot is to provide information to the captain, who in turn makes decisions based on this input. Yet, like other work environments, the captain still has the final say in the decision, whether the copilot (subordinate) agrees with the decision or not.

Most captains operate on the CII axis, which is a consulting relationship with the copilot. Ideas, concerns, and suggestions are solicited and then the captain makes a decision which may or may not reflect the copilot's influence. Other times, the captain might operate on the AI axis, where decisions and problems are dealt with solely by the captain with an exclusion of input from the copilot. Although this can be problematic, there are times when this approach might need to be used. For instance, if the copilot becomes incapacitated. Other times, as in a time-critical emergency situation, the captain may need to make a snap decision. In this case, there is simply no time for solicitation of input from the copilot due to the criticality of the situation. Another example might include the pairing of an experienced captain with a brand new and relatively inexperienced copilot. To makes matters worse, it might be the copilot's first job flying a high-performance jet. Copilots are hired based on their ability to eventually upgrade to the captain position and therefore are acting as an apprentice to some extent. The problem, therefore, lies in the disparate experience levels of the two crewmembers. Often, the copilot is just too inexperienced to provide the right information at the right time to the captain. Or, the copilot might be too overwhelmed by the amount of activity that occurs in jet operations. Whatever the case, the captain might have no choice but to assume an AI leadership style. This is not congruent with the principles of CRM, but it is an unfortunate part of some cockpit environments.

The final alternative model is called *contingency leadership*. The focus will be on *cognitive resources theory* (Fiedler, 1986; Fiedler & Garcia, 1987). A derivative of situational leadership, this model focuses on the cognitive abilities of the leader. Contingency leadership is in stark contrast to transformational leadership for a few reasons. First, the cognitive resources theory posits that there is more of a focus on a leader's intelligence and experience as a successful predictor of subordinate performance (Yukl, 2002). Second, cognitive resources theory does not focus on a transactional or fostering exchange between leaders and followers as in transformational leadership. Instead, cognitive resources theory suggests that a leader's persuasiveness is influenced by his or her intelligence and experience. This can be beneficial or problematic, depending on how it is framed. For instance, subordinates will likely try to please a leader who they find knowledgeable and experienced. On the other hand, a 'halo effect' can be created whereas the subordinates feel that the leader must always make the right choices and decisions because of these very attributes. Third, *stress* is introduced as variable in the cognitive resources model. Conversely, the transformational model does not take this variable into consideration. The effects of stress on decision making, particularly in a high-risk environment such as aviation, cannot be ignored. Fiedler (1986) suggests that under low stress, high intelligence results in good plans and decisions. However, under high stress, intelligence does not provide enough of a barrier to shield against faulty decisions.

The applicability of this model to cockpit leadership should not be ignored. The captain is the leader of a team that is responsible for hundreds of lives every day. It goes without saying that a captain possesses a good amount of intellect and experience (he or she must be in order to have progressed to that position). In stressful situations, though, this model suggests that the captain's leadership ability and judgment could become impaired, leading to poor decisions.

However, there are studies that suggest a mitigating effect on stress in the cockpit. In a literature review on stress, team performance, and leader traits and behaviors, Burgess, Riddle, Hall, and Salas (1992) found that although performance for teams was poorer under stress, there were certain behaviors performed by the leaders that lessened the impact of stress. These included: accepting team input, providing feedback, structuring the team, planning and coordinating team task performance, emphasizing goals, preparing the team for upcoming crises, and giving explanations for decisions made and actions taken. As a result, it appears that stress can actually improve leadership in the cockpit at a time when it is needed the most.

In sum, the cognitive resources theory could be effective in the cockpit because of the captain's vast intellectual and experiential resources. In normal situations, the captain should be able to lead effectively because of the latter. Whether the captain can maintain good decision making under stress is what will determine effective leadership in the cockpit. The limitations include, as before, the applicability of the model to a two-person crew (as compared to a large group). All three of the alternative models have been empirically validated with the use of groups in non-aviation settings.

Conclusion

While transformational leadership has been shown to be effective in promoting organizational safety with a 'charismatic approach' in large groups, it is not as clear whether this leadership style can be successfully transferred to a two-person cockpit. Empirical studies tying transformational leadership (as a construct) to the cockpit are virtually nonexistent. Most of the literature discovered for this review focused on the exchange of information between captains and copilots and the captains' open or closed use of input in the final decision process. On the

other hand, multicultural issues in the cockpit have been studied extensively and a few of these studies have been included in this paper. Clearly, multicultural issues further confound the effective use of transformational leadership in the cockpit.

In closing, it would seem that using components of various leadership styles would be the most effective in the cockpit. No one approach is mutually exclusive. A highly effective captain should address leadership from multiple perspectives. There will always be situational, people, cultural, and organizational variables; variables that might have to be dealt with by the use of multiple leadership approaches. The purpose of this paper was to provide additional insight about these different approaches.

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