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Cockpit learning in power distant cockpits: The interaction effect of pilot's interdependence and inclination to teamwork in airline industry

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ABSTRACT

Cockpit learning is an essential feature of flying profession, but it may be hampered by power distance in the cockpit due to captain/co-pilot subordination. Speaking-up to the captain may be difficult for some co-pilots but not speaking-up resulted in numerous aircraft accidents. This research examines cockpit learning among airline pilots and assumes that power distance reduces cockpit learning whereas pilot's interdependence and pilot's inclination towards teamwork can counter balance it. The study develops a short cockpit-learning-scale and validates it through a stratified sample of 231 pilots chosen from British Airways, Pakistan International Airline and Saudi Arabian Airline. Data analysis indicated a strong negative influence of power distance on cockpit learning, and significant interaction effect of pilot's interdependence and pilot's inclination towards teamwork. Together, the findings suggest that pilot's interdependence and inclination towards teamwork significantly minimize the negative influence of power distance on cockpit learning.

1. Introduction

Over hundred years, aviation industry has seen unprecedented vocational changes and learning challenges. It has progressed from a few seconds flight in Kitty Hawk to Voyager's long expeditions beyond the orbit of Pluto (Schultz, 2003). This phenomenal advancement relied on seamless knowledge sharing across departments and among pilots in the cockpit for shared learning and safety. To be on duty without a break for 12–16 h in the cockpit surrounded by complicated avionics, flight controls, weather constraints, fuel planning, monitoring instrument panel, cruising at high speed and altitude with hundreds of passengers on board, is how the cockpit of a passenger airplane looks like. The cockpit of a fighter aircraft is more demanding at mach 2 by carrying additional instruments for weaponry, precise target acquisition and multi tasking. Always pursuing a flawless execution, flying profession is not much different from present unforgiving corporate world i.e. one slipup can let your company bankrupt (Murphy, 2005). This workplace demands high situational awareness, superior flying skills and effective cockpit learning. It is a common belief that dual pilot cockpits should be safer as compared to a single pilot cockpit. Airbus, Boeing and all other fighter aircraft manufacturers design modern aircrafts to be flown ideally by evenly credentialed crew of pilot and copilot (Smith, 2013). But in dual pilot cockpits the pilot error ratios are considerably higher (Shappell and Wiegmann, 1996). Merritt (2000) found significant presence of power distance in the aircraft cockpits, and Gladwell (2011) pointed out power distance and subordination causing miscommunication in majority of aviation occurrences.

Besides other academic subjects, the basic flying skill of handling flight controls and cockpit checks are learnt directly from instructor pilot/captain in the cockpit or simulator. Sexton and Helmreich (2000) argued that good flying skills cannot overcome the adverse effects of hampered and poor communication in the cockpit. Positive communication is required for collaborative learning (Anastasios, 2008), where receiver decodes accurately what the sender wants to send (Zastrow, 2001). It works well in low power distant context (Walton and Parikh, 2012; Adeyemi and Omorogbe, 2012), and technology enhances learning outcomes effectively in low power distance perspective (Koh and Lim, 2007). Information sharing and positive communication is nowhere as important as it is in the airplane cockpit (Baron, 2004). Literature confirms that teamwork is essential to aviation safety (Ajeigbe, 2012). Therefore, teamwork for social interaction and communication of air crew are at the core of crew resource management (CRM) training (e.g., Prince and Salas, 1993; Salas et al., 1999; Oser

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et al., 2001; Davies, 2001). A high degree of interdependence is required to cultivate teamwork, and Donova (1996) considered it as the "teamwork glue". In interdependent state, the pilots communicate positively, are fully aware of how they are "tied together", and why collaborative learning is for their self-interest and safety. Based on prior research it is plausible that interdependence and teamwork are two factors that reduce power distance, promote effective communication, encourage knowledge sharing, and foster cockpit learning for safe flying.

Indeed, the negative influence of power distance on air crew communication has been extensively studied (e.g. Beaty, 1995; Chute and Weiner, 1996; Wiegmann and Shappell, 1997; Snook, 2000), and how aviation industry has suffered over 70% accidents due to poor communication/coordination among pilot-copilot and among cockpit crew-air traffic control rather technical or material failure (e.g., Rufflesmith, 1979; Lautman and Gallimore, 1987; Connell, 1995; Shappell and Wiegmann, 1996; Krifka et al., 2003). But the subtle influence of power distance on cockpit learning and its implications on aviation safety remained undetected and have not been explored much. This study takes into account the negative influence of power distance (PD) on cockpit learning (CL) in the airline industry and considers that negative relationship between power distance (PD) and cockpit learning (CL) may be reduced by the interaction effect of pilot's interdependence (IDP) and their inclination towards teamwork (ITW) in the cockpit.

2. Literature review

Prior literature was reviewed to get insight of cultural variable (power distance) in the cockpit context, its effect on communication and cockpit learning among pilots, and its implications for aviation safety. Review also considered how pilot's interdependence and inclination towards teamwork may reduce the negative influence of power distance on learning in the cockpit.

2.1. Power distance and cockpit communication

Power distance is one of the five cultural facets identified by Hofstede (1980) which reflects human inequality in distribution of power and authority (Hofstede, 2001). Working relationship greatly depends upon power distance. In low power distant workplace employees are perceived as partners and management style is more or less the democratic one. On contrary in high power distance cultures the management style is the autocratic one where managers and the employees apparently consider each other as unequal, and superior man is the one who often takes a decision without consulting subordinates (Hofstede, 2001; Hofstede and Hofstede, 2005; Sagie and Aycan, 2003). Whereas low power distance encourage participation to communicate vertically and horizontally, and allow subordinate to channel his/her ideas towards decision making (Mead, 2003; Krieger, 2005; Walton and Parikh, 2012; Adeyemi and Omorogbe, 2012), and also brings down the gap between senior-junior and positively affects knowledge management (Hauke, 2006).

All modern cockpits are operated by pilot and his underling, co-pilot. A copilot makes just as many landings and takeoffs as his captain do, and he is completely qualified to manage all flight regimes, including emergencies. In fact, at times the captain hands-on flight control to copilot and he manages calls, checklists, troubleshoots and plenty of other chores. Regardless of who's flying, the final authority rests with the captain and a superior salary for it (Smith, 2013). In many situations, particularly in air force and military aviation, an equally competent or less experienced pilot is scheduled as captain for routine flying sorties, training, standardization check rides and currency missions.

As aviation sector add-ons, so do the cockpit is becoming multicultural due to widespread mergers, acquisitions and failures. Pilots from different national orientation, languages, organizational culture, and previous military/civilian background are sharing the cockpit in a new setup (Helmreich, 1999). Merritt (2000) in his replication study of 9400 airline pilots in 19 countries relating the cultural indices set forth by Hofstede (1980) found a significant replication of power distance in cockpit with .87 correlation coefficient. In the aircraft cockpit power distance is by virtue of seat position, and it defines itself by inequality between captain and copilot. Prior aviation studies discovered that poor communication due to cultural factors has been a common cause of pilot errors in making decisions (e.g., Beaty, 1995; Chute and Weiner, 1996; Shappell and Weigmann, 1997; Snook, 2000). Gladwell (2011) identified two most likely places of miscommunication: among cockpit crew i.e. pilot-copilot and among cockpit crew and air traffic controller. And, two main reasons for it: Cultural reason which is measured by power distance, and ranking reason driven by job subordination. He posited that these factors force co-pilots for using mitigated speech and avoid confronting the captain when necessary. The pilot in the cockpit must be good as both an equal colleague (subordinate) in a team context and an assertive captain of the aircraft. This dichotomous role of a pilot establishes a fine balance to be maintained constantly for positive communication and effective learning.

2.2. Cockpit learning and flight safety

Learning is acquiring knowledge/skill, or developing a particular behavior through experience, training, or study. To every paradigm of vocational education, learning is considered as a fairly long–term change in behavior and practice is a necessary requirement for its desirable effect (Tóth, 2012). For the last two decades scholarly interest have considerably increased to find out how learning takes place during work, because of work, and for a particular work (Tynjälä, 2013). Several branches of learning theories are employed in pilot training program to enhance learning process. For pilot it is essential to practice a specific skill but flying cross-country and operational missions requires a blend of putting cognitive theory and behaviorism together (Aviation Instructor's Handbook, 2008). Despite high reliability, flying profession is increasingly susceptible to situations where cockpit crew must be skilled enough to perform error-less for safety of those aboard the airplane and many others on ground. Shappell and Wiegmann (2004) conducted a meta-analysis of more than 16,000 aircraft accidents of United States Air Force, Army, Navy, Marine Corps, commercial, and general aviation that occurred during 1990–1998. Their results revealed that across all operations, skill-based errors were the major human factor of accidents. Pilot skills are learnt and improved well under informal environment in cockpit and elsewhere through knowledge sharing and discussion. Elite fighter pilots in U.S. have discovered effective brief/debrief or postmortem as a secret of continual improvement. They informally discuss what they did in the cockpit? Where did they go wrong during the mission? And it helped them to perform better as a team (Duke and Murphy, 2011).

Studies found that in 70% occurrences, pilot in the cockpit knew that there was some problem, but could not share it (Iani and Wickens, 2007; Baltic Aviation Academy, 2013).

NASA launched an all-out survey of jet aircraft occurrences (1968–1976) and found that pilot error in terms of team coordination and communication has been the causal factor for majority of occurrences (Cooper et al., 1980; Murphy, 1980). In several occurrences of Asian Airlines, accident investigators pointed out the

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