

# **Concurrent Engineering, LMX, Envy, and Product Development Cycle Time: A Theoretical Framework**

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*Concurrent engineering technique offers competitive advantage to organizations. The literature suggests that concurrent engineering practices are influenced by human and technical factors, which are present within a firm. Despite the importance of human factors, researchers typically have focused on operational and technical issues of implementation of concurrent engineering practices. More specifically, the role of human factors such as leadership, perceived equity and envy has not been explored in concurrent engineering context. Furthermore, the influence of envy on cross-functional team performance and product development cycle time has not been examined. To this end, the current study investigates the impact of leader member exchange on envy, and the outcomes of envy in terms of cross-functional team performance and product development cycle time. An integrated framework which would be beneficial to managers and practitioners is presented. Finally, we draw conclusions and present some avenues for future research.*

## **INTRODUCTION**

Manufacturing industries have been affected by numerous trends in recent times. One of the important trends to significantly influence the manufacturing industries is the reduction of product development cycle time. Concurrent Engineering (CE) practices have traditionally known to minimize the product development cycle time (Lawson & Karandikar, 1993; Kusiak, 1993). However, there have been instances where the implementation of CE have not yielded desired results in terms of reduction of product development cycle time (Braha, Klein, Sayama & Yam, 2003; James, 1999; Klein, Sayama, Faratin & Yam 2003, Maylor, 1997; Maylor & Gosling, 1998; Naveh, 2005). Mixed results may be because of the following reasons:

First, despite the presence of case studies and fact based research, plethora of studies have voiced concerns about lack of adequate attention to theory development and mechanisms involved in CE practices (Ford & Serman, 2003; Koufteros, Vondersembse & Doll, 2001). Second and most importantly, despite the fact that CE is widely considered as a human and technology centered procedure (Jones, 1995; Vajna & Burchardt, 1998), researchers have mainly focused on technical aspects of CE and have commonly omitted the human factors such as emotions.

In a CE work settings, significant work is carried out by using cross-functional teams. Moreover, research has shown that when people work in teams with a similar objective, it leads to frequent work- or

non-work-related comparisons (Duffy & Shaw, 2000; Smith & Kim, 2007). Such comparisons can prove to be detrimental to one's self-esteem if the individuals find themselves on the lower end in the comparison with others thereby giving rise to unpleasant envious emotions (Vecchio, 2000; Wood, Michaela & Giordano, 2000). From a psychological perspective, envy arises as a result of social comparison which is of unpleasant nature due to the fact that the comparison highlights one's deficiencies. Therefore, it becomes imperative to investigate the implications of negative emotions such as envy in the CE crossfunctional team context.

In addition an important aspect of crossfunctional team based environment is the relationship quality of the supervisor and the subordinates which is referred as leader member exchange (LMX). Research has shown that LMX has positive impact on team performance (Wayne, Shore, & Liden, 1997). As CE is mainly studied in a team context, LMX should have strong implications for the success of the CE initiative. Majority of the literature views LMX in a positive light (Gerstner & Day, 1997; Graen & Uhl-Bien, 1995) and does not venture into the "darker side" and more specifically the consequence of lower quality of LMX on organizational and team outcomes. This becomes very important as the lower quality of LMX has been linked with higher turnover intentions and reduced employee performance which can be a threat to organizational and team productivity (Kim, O' Neill & Cho, 2009; Mayfield & Mayfield, 1998). Also, research investigating the impact of quality of LMX on envy in the workplace context and particularly CE crossfunctional team context is scant (Kim et al., 2009; Vecchio, 1995). Furthermore, prior research does not delve into the dynamics of LMX- envy relationship, and therefore is of no assistance in unraveling the complexities that underlie this relationship.

To this end, the study has two major purposes. First, it examines the impact of leader-member exchange (LMX) on employee envy in the CE context. In the process, it also investigates the impact of equity sensitivity on the aforementioned relationship. Equity sensitivity is defined as an individual's tolerance towards equal treatment and is widely researched personality variable (Huseman, Hatfeild & Miles, 1987). It is vital to consider the equity sensitivity as past research has linked envy with personality factors (Mishra, 2009). However, more research is needed in order to clearly demonstrate the intriguing role that personality factors might play in envious feelings of an individual. Thus, we feel that equity sensitivity will play an important role in LMX -envy relationship because LMX deals with differing level of leader's treatment towards his subordinates. Secondly, the study also examines the impact of envy on cross-functional team performance and the desired CE outcome such as reduction in product development cycle time.

The study has some unique contributions to both the OM as well as the OB literature. First, majority of the existing literature on CE in OM focuses on defining CE, exploring the importance of CE, and highlighting the consequences of CE from a technical viewpoint (Bogus, Molenaar, & Diekmann, 2005; Koufteros, Vondersembse & Doll, 2001; Tan & Vonderembse, 2006). Little has been done to investigate the human mechanisms involved in CE practices. To this end, we seek to capture the role of negative emotions and its influence on organizational outcomes in the CE context.

Second, despite the universal nature and its impact on social interactions, envy has been relatively ignored from the mainstream research. Researchers have mostly focused on highlighting that envy can be instrumental in predicting important attitudes and behaviors (Vecchio 1995; Vecchio, 2000; Duffy & Shaw, 2000). However, more research is needed in order to better understand the dynamics underlying envious feelings.

Third, to the best of our knowledge, there is no published study that explores the relationship between LMX, envy and equity sensitivity. Also in a CE context, no study has thus far explored the impact of negative emotions such as envy on cross-functional team performance and competitive advantage factors such as product development cycle time. This study can be helpful to managers in broader as well as CE context as it will provide them a platform to understand how their differing relationships with employees can arouse invidious emotions within some employees, which in turn, can result in negative outcomes.

## **LITERATURE REVIEW**

### **Leader-Member Exchange**

Leader-member exchange theory, which was developed as an extension of vertical dyad linkage model, emphasizes the differing levels of relationship that form between leaders and their subordinates (Dansereau, Grean & Haga, 1975). The LMX deals with the degree to which leader and subordinate exchange resources and support beyond what is expected based on the formal contracts. LMX quality has been found to play an important role on employee performance (Gertsner & Day, 1997) and other outcomes such as employee attitudes (Dansereau et al., 1975). However, substantially less attention has been paid to impact of LMX on employee emotions such as envy (Kim et al., 2009). Also, as CE mainly deals with the use of work teams, LMX and employee emotions may have important implications in the CE context.

### **Envy**

Envy is defined as “an unpleasant and often painful blend of feelings characterized by inferiority, hostility, and resentment caused by a comparison with a person or group of people who possess something we desire” (Smith & Kim, 2007, p. 49). It is generally considered a socially undesirable emotion and has been commonly experienced by most of the people regardless of their culture (Smith & Kim, 2007). From a psychological perspective, envy arises as a result of social comparison which is of unpleasant nature due to the fact that the comparison highlights one’s deficiencies. It is commonly considered to be detrimental to the self-esteem. People feel envy when they notice an advantage being enjoyed by another individual (Smith & Kim, 2007). This advantage often gives rise to envy due to three main reasons. First, the individual is perceived to be similar in all aspects except for the advantage. Second, the advantage is related to a domain of high self-relevance. Third, the advantage seems to be beyond attainment by the individual. This coming together of similarity, high self-relevance, and low control creates a set of likely cognitive emotional appraisals and reactions which produce a blend of inferiority, hostility, and resentful feelings that is often given the label of envy (Smith & Kim, 2007). Given the fact that work scenario within the CE environment is characterized by highly interdependent cross-functional work teams, envy will have a strong potential to impact the CE outcomes.

### **Equity Sensitivity**

Equity theory emphasizes that individuals evaluate their efforts and subsequent outcomes against the efforts and subsequent outcomes of their peers (Adams, 1965). When perceived in context of a CE cross-functional team setting, this theory suggests that employees compare their efforts and outcomes against their team members to find out whether they are being treated fairly. According to the equity theory, if the employees find inequity i.e. either they are being under rewarded or over rewarded, they will be motivated to restore equity (Adams, 1965). Based on the equity theory, Huseman et al. (1987) suggested that individuals are different in terms of their preferences for equity and coined this individual difference as ‘Equity sensitivity’.

### **Cross-Functional Team Performance**

CE practices, which include process and product development, involve the formation and utilization of cross-functional teams (Celtek & Kaynak, 1999; Harrell, Emanuel & Kroll., 1995; Swink & Sandwig, 1996, 1998; Wilson & Grey-Taylor, 1995). Cross-functional teams involve the integration of members from different functional backgrounds such as engineering, manufacturing, marketing, accounting and logistics. The benefits of cross-functional teams include a significant reduction in the development cycle time, product life cycle cost and engineering changes (U. Kumar, Fantasy, V. Kumar & Boyle, 2006). As companies focus on achieving high quality, fast product innovation and improved customer satisfaction, team performance becomes critical to realizing the above mentioned goals (Banker, Field, Schroeder & Sinha, 1996). Cross-functional team performance is operationalized in terms of degree to which goals set by the team are attained, the quality of the overall project, and the overall efficiency with which the team

conducts operations (Sethi, 2000; Sethi & Nicholson, 2001; Sethi, Smith & Park, 2001).

### Product Development Cycle Time

Product development cycle time becomes extremely important as organization strives to launch product early in the market. It represents the average time taken by an organization to develop variety of products (Arditti & Levy, 1980; Brockhoff, 1967; Cohen, Eliashberg & Ho, 1996; Harter, Krishnan & Slaughter, 2000). If the product is launched early in the market as compared to other competitors, the firm has an advantage to learn from customer responses (Brown & Lattin, 1994). Other benefits identified

**TABLE 1**  
**DESCRIPTION OF DIFFERENT CONSTRUCTS USED IN THE STUDY**

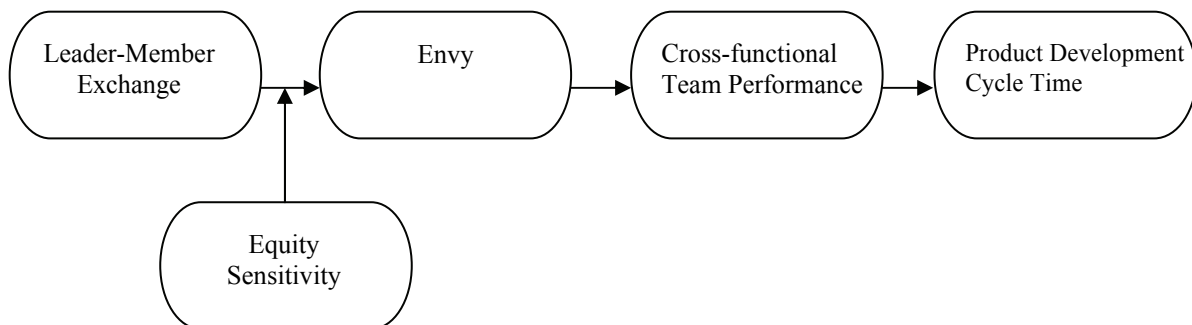
<b>Research model constructs</b>	<b>Description of construct</b>	<b>Vital Studies</b>
Leader member Exchange	Quality of exchange relationship between leader and its Subordinates	Dansereau, Graen, & Haga, 1975; Gerstner & Day, 1997; Liden, Sparrow & Wayne, 1997; McClane, 1991; Scandura,
Envy	A negative emotion felt when a person lacks another's superior quality, achievement, or possession and either desires it or wishes that	Vecchio 1995; Vecchio 2000; Parrott & Smith, 1993; Smith & Kim, 2007.
Equity Sensitivity	The individuals are different in terms of their preferences for equity. This individual difference is referred as 'Equity sensitivity'.	Huseman et al. 1987; Kickul & Lester, 2001; King, Miles & Day, 1993
Cross functional team performance	Deals with performance issues of teams such as cost savings, exceeding customer expectation, quality of work accomplished and meeting time line set in projects.	Ancona, 1990; Ancona & Caldwell, 1993; Banker, Field, Schroeder & Sinha, 1996; Early & Mosakowski, 2000; Hertel, Kondardt & Orlikowski, 2004; Linderman et al. 2003; Sherman, Souder & Jenssen, 2000; Stewart & Barrick, 2000; Oertig & Buergi,
New product development cycle time	The average time taken by an organization to develop variety of products.	Arditti & Levy, 1980; Brockhoff, 1967; Cohen et al. 1996; Harter, Krishnan & Slaughter, 2000; Itter & Larcker, 1997; Lilien & Yoon, 1990; Marco, 1993;

in bringing the products quicker to market include extended sales life of the product and increase in market share (Pawar, Menon & Reidel, 1994). Table 1 highlights the description of variables used in the study.

## THE INTEGRATED FRAMEWORK AND THE PROPOSITIONS

For the purpose of developing the relationships, in addition to the operations management literature, organizational behavior literature, social psychology literature, and new product development literature were also considered. This approach was used to provide a detailed analysis of the propositions. The Figure 1 represents the integrated framework and the following subsection explores the relationships between different constructs. In additions, explanations for the relationships are also provided.

**FIGURE 1  
RESEARCH MODEL**



### Leader-Member Exchange and Envy

In a CE context and particularly in a cross-functional team setting the interactions between leaders and followers is extremely important. LMX is defined as the quality of exchange relationship between a subordinate and his or her immediate supervisor. LMX emphasizes that leadership effectiveness cannot be understood without examining how supervisors and employees influence each other over time (Dansereau, Graen & Haga, 1975). It is based on the premise that a supervisor has different type of working relationship with each subordinate within the same workgroup (Gerstner & Day, 1997). With some of the subordinates, leaders develop high quality LMX relationships in which reciprocal exchanges go beyond that is formally required in the organization, whereas with the other subordinates they share low quality LMX relationships which are limited in executing the tasks required by the formal contracts (Liden & Graen, 1980). High quality LMX is characterized by higher levels of trust, liking, commitment and respect (Graen & Uhl-Bien, 1995).

Empirical research has demonstrated that high quality LMX relationship fosters employee attitudes and behaviors, which are beneficial to leaders and organizations such as organizational citizenship behaviors (Deluga, 1994; Setton, Bennett & Liden, 1996; Wayne, Shore & Liden, 1997) higher performance and organizational commitment (Dienesch & Liden, 1986; Wayne, Shore, Bommer & Tetrick, 2002). In addition, subordinates having high LMX relationships are more likely than those in lower LMX relationships to receive challenging task assignments, training opportunities, resources, information and support (Liden, Wayne & Sparrowe, 2000; Scandura, Graen & Novak, 1986). Subordinates with high quality LMX relationships may actually perform better because of the added support, feedback, resources and opportunities provided to them (Feldman, 1986). Also, leniency bias appears to inflate performance ratings for employees with higher quality LMX relationships. However, in low quality LMX relationships, leaders rate members strictly according to established performance

standards (Duarte, Goodson & Klich, 1994; Heneman, Greenberger & Anonyuo, 1989). Given the fact that in most of the organizations, promotions and rewards are performance based; each employee within the same workgroup can realize which employees are receiving advantages because of supervisor's affinity towards them (high LMX). By comparing what they receive and what others receive, feelings of envy may arise. In addition, as a primary source of critical aspects regarding work, LMX can become a basis for comparison among each employee within the workgroup (Kim et al, 2009). When employees perceive that their relationship with the leader is worse (low LMX) as compared to their peers (high LMX), it will disturb their sense of balance (Heider, 1958), which ultimately will give rise to envious feelings. Cohen and Charash (2000) described following as an important condition of envy in a job promotion situation: 'When a person X notices that a similar other, person Y, gets promotion, which is important for a person X in such a way that X wants it but does not have, X is likely to experience envy' (Cohen & Charash, 2000; p 2). Thus, we propose

*Proposition 1: In a cross-functional team setting, the quality of LMX will be negatively related to the employee envy.*

### **Moderating Role of Equity Sensitivity**

Equity sensitivity has an important role to play in the relationship between LMX and employee envy. As mentioned previously, equity sensitivity is the difference in individuals towards their preference for equity (Huseman et al., 1987). The term equity sensitivity is characterized along a continuum according to the outcome-input ratios. At one extreme of the continuum, there are benevolent individuals who prefer their outcome/ input ratio to be less than that of their peers, while on the other end of continuum, there are entitled individuals who prefer their outcome/input ratio to exceed the ratio of comparison others. In the middle end of the continuum are the equity sensitive individuals who prefer their outcome/input ratio to be equal to the ratio of their peers.

More recently, researchers have stressed that individuals differ in their tolerance for inequity rather than in their preference for inequity (King, Miles & Day, 1993). Various studies have utilized equity sensitivity as a moderator variable. For instance, Huseman et al. (1987) suggested that equity sensitivity moderates the relationship between perceived equity and attitudinal and behavioral outcomes. They stressed that lower equity sensitive individuals (Entitleds) would be more sensitive to unfair resource allocations because of their low tolerance for under reward. On the contrary, higher equity sensitive individuals (Benevolents) would be less sensitive to unfair reward allocations due to their greater tolerance for under reward (King et al., 1993).

O'Neil and Mone (1998) demonstrated that equity sensitivity had a moderating effect on the relationship of self efficacy with job satisfaction and intent to leave. Higher equity sensitive individuals were found to experience similar lower levels of job satisfaction and similar higher intent to leave regardless of their self efficacy. Also, Kickul and Lester (2001) explored the moderating role of equity sensitivity on the relationship between psychological contract breach and employee attitudes and behaviors. More specifically, they demonstrated the moderating effect of equity sensitivity on the relationship between psychological contract breach and job satisfaction. Taken together, all of these studies suggest that equity sensitivity is found to be a crucial factor in determining the strength of relationship between variables which deal with fairness of outcomes allocations. Thus, individuals who own an ethical predisposition of equity sensitivity are likely to be more concerned with the fairness of outcome allocations. These outcomes allocations can also be perceived as a result of exchange relationship between the leader and the subordinate. Previous research suggests that higher LMX is related to rewards such as receiving more resources to perform the task, higher performance rating, better training opportunities, information and support (Liden, Wayne & Sparrow, 2000). In a cross-functional team setting, if the employee is on the entitled end (lower equity sensitivity) of the continuum, he is likely to be more distressed due to the unequal treatment by the leader as compared to the team member who is on the benevolent end (higher equity sensitivity) which might affect his emotions strongly. Therefore, lower equity sensitive individuals are more likely to develop envious feelings against their peers who share a

better rapport with the leader, as compared to higher equity sensitive individuals. Consistent with this line of reasoning, we propose:

*Proposition 2: In a cross-functional team setting, the effect of LMX on employee envy will be moderated by equity sensitivity such that effects will be stronger and more negative for individual with lower equity sensitivity (entitled) than for the individual with higher equity sensitivity (benevolent).*

### **Envy and Cross-Functional Team Performance**

Envious feelings among team members can have strong implications towards the team performance. Experience of envy pertains to the feelings in which one's weaknesses or flaws dominate an individual's psychology. This often leads to low self esteem, anxiety, hostility, depression, and reduced self efficacy (Duffy & Shaw, 2000). Moreover, research has shown that feelings of depression and reduced self efficacy hamper with one's ability to perform well (Andrews & Wilding, 2004; Paton, 2009). Thus, we believe that the degree to which envious feeling intrude the ability to perform; increase in envy will be associated with reduction in team performance. This leads to the following

*Proposition 3: Envy within the cross-functional team will be negatively related to cross-functional team performance.*

### **Cross-Functional Team Performance and Product Development Cycle Time**

Organizations today are implementing techniques for integration of process, and product design. It has been mentioned that faster new product development can have significant effect on economic rewards. Introduction of product early to market helps company extend the product life cycle, develop and manufacture cost advantages and set premium pricing (Karagozoglu & Brown, 1993). Cross-functional team performance has been shown to be one of the enablers of product development cycle time (Denison, Hart & Kahn, 1996; Ittner & Larcker, 1997). The performance of the cross-functional team is found important to analyze different problems arising during product development cycle. Different individuals possessing expert knowledge in different fields share information and improve the efficiency of the design process (Brown & Eisenhardt, 1995; Clark & Fujimoto, 1989). Increase in cross-functional team performance is associated with reduction in product development cycle time (Denison et al., 1996; Ittner & Larcker, 1997). This efficiency is achieved as members of the cross-functional team bring different perspectives from their own area of expertise (Denison et al., 1996). It helps to minimize the design errors and other bottlenecks associated with the new product development; and speeds up the decisions, which eventually improves the overall efficiency of the product development cycle (Blackburn, 1991). However, the cross-functional team performance has found to be deteriorated due to negative emotions such as interpersonal envy among the team members (Duffy & Shaw, 2000; Smith & Kim, 2007). This will minimize the efficiency of the product development cycle and increase the overall product development cycle time. Thus, it is imperative that increase in cross-functional team performance is associated with reduction in the product development cycle time whereas decrease in cross-functional team performance is associated with increase in product development cycle time. This leads to

*Proposition 4: Decrease in cross-functional team performance will result in increased product development cycle time.*

## **DISCUSSION AND IMPLICATIONS**

CE research is at crossroads. The motivation to carry out this study was due to the fact that even though organizations implement CE, there has been evidence of lack of desired results. Furthermore, as pointed out by Swink (1998) the implementation of CE practices is always replete with issues. Time and again researchers have highlighted the importance of human issues in the CE context (Mittal & Morse,

1992; Tayyari, 1992). More specifically, the research in the CE stream faces a challenge in terms of effectively identifying factors that are crucial for the functioning of CE teams.

The heart of CE is integration of all functions in product development stage (Lettice, Smart & Evans, 1995). Teams play a significant role in achieving the integration (Lettice et al., 1995). Considering the fact that CE involves investment in human expertise at all stages of the process, it becomes important to systematically investigate issues related to cooperation of team members. Personality factors, emotions, and supervisor-subordinate relationships are human issues crucial to any work scenario. Simultaneous consideration of LMX, envy, cross-functional team performance and product development cycle time in the CE context has somehow eluded the researchers. The present study can be viewed as an initial step in this direction. Human issues become especially important in a CE work setting because cross-functional teams are formed which differ from traditional teams in the following manner (Filipczak, 1996). During CE projects, individuals from diverse backgrounds work in association for long periods, sometimes ranging from months to years (Filipczak, 1996). Managers need to understand that in such cases providing a short teambuilding class is not the final solution. The understanding of underlying key mechanisms facilitating CE is critical.

To this end, current study is specifically designed to provide managers with an overarching framework for understanding the underlying mechanisms and particularly the impact of negative emotions such as envy. The study would enable managers to further understand some of the factors involved in a successful CE implementation. The importance of investigating potential linkages in the CE context is particularly relevant because it has direct impact on firm's financial capabilities (Koufteros et al., 2001).

From a human issue standpoint, we expect our study to emphasize that the quality of supervisor-subordinate relationship within a cross-functional team setting is related to employee emotions. Much of management and particularly OB research in the past has highlighted the positive side of LMX demonstrating that it has been related with increased job satisfaction, organizational commitment, organizational citizenship behaviors, employee performance, and lower turnover intentions (Gerstner & Day, 1997; Graen & Uhl-Bien, 1995). There has been paucity of research which focuses on LMX particularly in the context of an employee emotion (Kacmar, Zivnuska & White, 2007; Kim et al., 2009). Our study sheds more light on the view that LMX is an important factor in the arousal of invidious emotions within employees. Specifically, our study highlights that lower equity sensitivity can strengthen the relationship between LMX and envy. One of our contributions is in an attempt to examine the crucial role that equity sensitivity plays in the relationship between LMX and envy.

Since research has shown that envious feelings are likely to be nurtured when employees work in groups (Duffy & Shaw, 2000; Vecchio, 1995), work scenarios within cross-functional team settings serve as an ideal platform to give rise to such feelings. For instance as a part of their work, employees interact with each other frequently while regulating their emotions. Due to such demands, employees are likely to feel emotional exhaustion and burnout (Kim, 2008). Therefore, supervisor should strive to keep a regular watch on employee emotions by giving them personal guidance and counseling. Second, supervisors should design impartial and objective systems when assigning jobs, duties and responsibilities. The reasons behind why one gets some resources while others do not, should be clearly underscored by supervisors so that differences are understood by every employee, which in turn, will obviate or curb the arousal of invidious emotions. Third, supervisor should provide necessary training for employees which should convey the message that each employee is unique and valued. This should inhibit the envious feelings resulting from comparisons with others (Bedeian, 1995). Finally, informal meeting and social activities between supervisors and their subordinates should be promoted within the organizations (Kim et al, 2009). This will improve their relationship quality, which in turn, would reduce the likelihood of arousal of envious feelings.

Managers would be advised to develop strategies to promote positive emotions of individuals, allow people to develop feeling of connectedness and remove the fear of reprisal. Support to this can be found in psychology literature. For instance, a view from the regulatory theory in psychology mentions that individuals condition their emotional responses depending on the situation. There are basically two types



of forces: promotion regulatory forces and prevention regulatory forces (Brockner & Higgins, 2001). In promotion of regulatory forces the individual would try to promote positive emotions aligned with the goal of the organization (Brockner & Higgins, 2001). In addition, in the prevention regulatory forces, the individual would try to avoid any contradictory goals. Managers should specifically try to create an atmosphere, which encourages both the promotion and prevention regulatory forces. This is critical not only in the CE context, but also in a broader organizational context as goals of individual and that of organizations should match. One of the ways to create such an atmosphere is by providing positive feedback. It has been established that providing positive feedback about the self regulatory process to people would likely culminate into positive emotions (Brockner & Higgins, 2001).

The proposition that envy would negatively impact cross-functional team performance in a CE context provides interesting implications for managers. Care should be taken to select an employee for a CE project. It is imperative that managers employ individuals who work productively despite facing envy evoking situations. Particularly the hiring practices in a cross-functional team environment can involve providing personality measures test and selection of employees high in empathy towards others. Also emphasis should be given to staffing and selection of an employee who provides a good mix of experience and creativity to the product development teams. Thus, the proposition would further support the view commonly expressed in literature that effective management of human capital is critical for obtaining improved team performance and competitive advantage (Pfeffer, 1994; Reich, 1991).

Product life cycle has been identified as a basic fuel for industries (Brockhoff, 1967; Harrell & Taylor, 1981). Reduction of cycle time is one of the criteria along with others such as higher quality, lower cost to assess process improvement (Harter, Krishnan & Slaughter, 2000). The proposition on the linkage between cross-functional team performance and product development cycle time will further strengthen the view that cross-functional teams and their performance is critical to the reduction in product development cycle time. Thus, it is recommended that managers should not focus solely on reduction in product development cycle time from a technical standpoint. Instead such efforts should be coordinated with practices such as managing employee emotions to further receive benefits in terms of increased cross-functional team performance which will further lead to reduction in product development cycle time.

## **CONCLUSION, LIMITATIONS AND FUTURE RESEARCH**

In conclusion, today when most of the organizations are indulging in CE, it is believed that the success of CE depends on understanding a variety of mechanisms and their potential impact on important outcomes. Thus, it is important for managers to understand the effects of all these interrelated factors in the CE context. As pointed before, no study has simultaneously considered the interactions among the LMX, envy, cross-functional team performance, and product development cycle time in a unified context. In this study, we have highlighted LMX as an important antecedent of employee envy. Precisely, we concluded that low quality LMX can cause envious feelings among employees. In addition, we also have concluded that relationship of LMX and employee envy will become stronger with higher levels of equity sensitivity. Furthermore, we also argue that envy which results from a lower quality LMX will negatively impact cross-functional team performance. This deteriorated cross-functional team performance will increase product development cycle time. This study contributes to both the OM and OB streams of research. From an OM standpoint, this study supports the view that in addition to the technical problems, CE issues should also be investigated with the behavioral underpinnings (Lindermann, Schroeder & Choo, 2006). Moreover, OM scholars have called for incorporating human behaviors and emotions to provide better insights to OM concepts and practices (Boudreau, Hopp, McClain & Thomas, 2003; Schultz, Juran, Boudreau, McClain & Thomas, 1998). Our paper is an effort in this direction.

Second, we have extended the literature on envy in an OB context as most of the research on envy exists in anthropological and sociological literature. Also, we have added to equity sensitivity literature by establishing it as an important moderator between LMX and employee envy.

Despite the findings there are some major limitations which need to be emphasized. First, one of the

major limitations of the study is the conceptual nature. Second, by no means our model can be considered comprehensive. There can be other variables such as competitive reward system (Dunn & Schewitzer, 2004), various personality traits (Smith, Parrott, Diener, Hoyle & Kim, 1999), organizational perks which could act as antecedents of employee envy and can be considered in context of the framework. Third, research model presented in our study does not necessarily imply the causal relationship among variables. An empirical study which employs a longitudinal research design is required to verify the causal relationship. Fourth, the importance of contextual variables such as group cohesion and social loafing in reference to envy- team performance relationship is mentioned in the literature (Duffy & Shaw, 2000), however, these factors were not considered to maintain parsimony of the study (Levine & Moreland, 1990).

The study also provides foundation for some of the interesting avenues for future research. First, we found that low quality LMX can give rise to envious feelings among employees. However, previous research has shown that some people are predisposed for feeling envy (Smith et al, 1999). Therefore, it would be interesting to examine the dispositional envy as a moderator between LMX and envy. Second, the model proposed in this study can be tested in a cross-cultural settings, especially focusing on two culturally distinct countries. For instance, the proposed model can be tested in an individualistic versus collectivistic cultural settings (Hofstede, 1983) and results can be compared. As individualistic cultures emphasize that people place self interests before collective interests while opposite is true for the collectivistic cultures (Hofstede, 1983). It would be worthwhile to examine the impact of highly individualistic emotion such envy in two culturally distinct societies. Third, from an OM standpoint, as pointed out by Linderman et al. (2006) more organizational behavior theories can be used to investigate OM phenomenon. To this end, the interplay of challenging goals, LMX, envy and its impact on cross-functional teams in a CE context can be investigated. Also, the impact of technology variables such as CAD usage and their moderating effect on the linkage between cross-functional team performance and reduction in product development cycle time can be explored. Also, in a cross-functional team context, the project group composition and project size can also affect team performance and these variables can be considered for future research. We hope that this paper will serve as a foundation to attract the scholars from both OB and OM fields. This will be instrumental to advance the knowledge concerning leadership and employee emotions in the CE context beyond our initial efforts in the current research.

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