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Is It We or They? The Effect of Identity on Collaboration and Performance in Buyer-Supplier Relationships

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Is It We or They? The Effect of Identity on Collaboration and Performance in Buyer-Supplier Relationships

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Business Administration

by

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ABSTRACT

In today's scale-driven and technology-intensive global economy, collaboration becomes the supply chain's core capability (Liker and Choi, 2004). A well-developed ability to create and sustain fruitful collaborations gives companies a significant competitive advantage (Kanter, 1994). Retailers are increasingly relying on their suppliers to reduce costs, improve quality, and develop new processes and products faster than their rivals' vendors can. On the other hand, suppliers benefit from retailers that they are able to monitor store-level demand in real time in order to ensure the top-selling items are in-stock or the accuracy and timeliness of retailer's demand forecast. Previous literature has shown various ways to promote collaboration in buyer-supplier relationships, but it may also have negative impacts such as deception (Gneezy, 2005), dishonesty (Mazar et al., 2008), or opportunism (John, 1984). This dissertation aims to investigate the impact of two types of identity (induced group identity and natural identity) on discretionary collaborative behaviors without any monetary incentives and supply chain performance in buyer-supplier relationships.

Using social identity theory (Tajfel and Turner, 1979), Essay 1 explores the influence of buyer-supplier identification which is defined as perceived oneness of a supplier/buyer with its partner's organization and experience of its partner's successes and failures as its own (Ashforth and Mael, 1989) on collaboration and supply chain performance, and the foundation and formation of buyer-supplier identification. To explore the effect of natural identity, particularly, gender identity, Essay 2 addresses the impact of gender composition in buyer-supplier relationships on collaboration, and supply chain performance. It investigates whether females and males exhibit differences in trust and trustworthiness. Controlled laboratory experiments are executed for Essays 1 and 2.

Together the two essays bring the concept of identity to supply chain management literature and advance our understanding of the enablers and drivers that can increase buyer-supplier collaboration and supply chain performance.

TABLE OF CONTENT

I. Introduction	1
Theoretical Background	7
Foundational Literature Review	14
Structure of The Dissertation	18
Contributions and Implications	20
Dissertation Outline.....	22
References	24
II. Essay 1.....	31
Introduction	32
Literature Review	36
Research Hypotheses.....	41
Methodology	44
Results	51
Discussions and Conclusions	57
References	61
III. Essay 2	69
Introduction	70
Literature Review	74
Research Hypothese	81
Methodology	87
Results	92

Discussions and Conclusions	96
References	98
IV. Conclusion and Future Research	107
V. Appendix	113

I. INTRODUCTION

“On July 15, 2014, Apple and IBM announced an exclusive partnership that teams the market—leading strengths of each company to transform enterprise mobility through a new class of business apps—bringing IBM’s big data and analytics capabilities to iPhone and iPad.”

----Apple Press Info

In today’s scale-driven and technology-intensive global economy, collaboration is the supply chain’s lifeblood (Liker and Choi, 2004). Companies build their ability to create and sustain collaborations to add new blood to their business and maintain their competitive advantage (Kanter, 1994). Collaboration can benefit firms. For example, in buyer-supplier relationships, retailers can obtain benefits such as cost reduction, quality improvement, and product and process development by collaborating with their suppliers. On the other hand, suppliers benefit from retailers that they can monitor store-level demand in real time to ensure the top-selling items are in-stock or the accuracy and timeliness of retailer’s demand forecast through collaboration. For example, Apple and IBM decide to collaborate that IBM uses their big data and analytics capabilities to support Apple’s product such as iPad and iPhone to improve product efficiency and consumer experiences. This would allow both Apple and IBM to achieve new levels of efficiency, effectiveness, and consumer satisfaction. Buyer-supplier collaboration not only yields benefit for partners, but also creates future and unforeseen opportunities. It is not just the exchange such as information or resources but creating new value for the relationship. Buyer-supplier collaboration can derive various critical resources such as funds, time, and proprietary knowledge for partners (Moros and Corsten, 2015). In the meantime, the power shared by the partners can capture the market share and business criticality that build a higher level of trust and satisfaction (Moros and Corsten, 2015). All those factors are the determinants of firms’ survival and success and the key factors to impact their competitive advantage.

Several studies have shown that buyer-supplier collaboration can be promoted by either “hard factors” or “soft factors”. Jap (2001) provides the evidence that resource sharing can determine the quality of the relationship such as satisfaction with the collaboration or willingness to collaborate in the future. Fawcett et al. (2007) indicate that information sharing is the factor that can increase collaboration among supply chain members. Further, Blomqvist et al. (2005) explore the impact of contract on collaboration between firms. They find that it is costly to have the full contract and contract itself cannot guarantee successful collaboration. However, the process of building the contract can make both firms understand each other’s goals and perspectives which would build collaboration. Lastly, Nyaga et al. (2013) find that non-mediated power is the source for collaboration between buyers and suppliers.

Overall, resource sharing, information sharing, contracts, and power are the hard factors that can determine the level of collaboration, and there are also soft factors that can impact collaboration. Luzzini et al. (2015) report that commitment can increase both intra-firm and inter-firm collaboration. Similarly, Hofer et al. (2012) show that trust can increase collaboration due to the reduction of relationship uncertainty. Chatman and Barsade (1998) identify the impact of culture differences on collaboration. They find that cooperative employees in collectivistic cultures are more likely to collaborate with their coworkers; they report working with the greatest number of people, and they prefer evaluating their work performance by team contribution rather than individual achievement.

While collaboration can be influenced by hard or soft factors, it is tough to make it work than companies imagine (Liker and Choi, 2004). Building collaboration requires a lot of efforts. Japanese companies have been successfully built collaboration such as Toyota, but many American companies do not successfully collaborate with their partners for the past 20 years

(Liker and Choi, 2004). Collaboration is costly to implement—they require extra communication, coordination, and risk sharing (Lambert and Knemeyer, 2004). Further, collaboration sometimes has a negative impact on the buyer-supplier relationships even during periods of growth or stability. It is inevitable to influence certain level of functional conflicts such as differing viewpoints or dysfunctional conflicts such as dissatisfied partner's performance (Kozan et al., 2006). Partners become increasingly dissatisfied as the relationship persists (Grayson and Amler, 1999). Similarly, Ephross and Vassil (1993) point out that annoying issues and conflicts are raising when two parties work closely with each other. In addition, collaboration is built with the expectation of benefits accruing to both parties which fuel the long-term relationship and make the parties stick together. However, it also nurtures the growth of opportunistic behaviors that is self-interest seeking with guile for the short-run benefits. This indicates that collaboration that is motivated by economic incentives (i.e. mutual benefits) is vulnerable to the benefits that they can earn through taking advantage of their partners in a short period (Anderson and Jap, 2005).

No matter to use resource sharing or power as hard factors or to build trust or commitment as soft factors to promote collaboration, collaboration is built either on exchange or benefits. As I discuss above, the relationship is vulnerable due to the negative impact of economic incentives. There is a “hidden cost of reward” (Frey, 1997). Frey and Jegen (2001) find that monetary incentives or punishments can crowd-out intrinsic motivation because individuals perceive themselves to be controlled by their partners. In this case, both self-determination and self-esteem suffer, and they react by reducing their intrinsic motivation in the activity controlled. Furthermore, researchers find that when the external reward vanished or

stable, they are more likely to exhibit deception (Gneezy, 2005), dishonesty (Mazar et al., 2008), or opportunism (John, 1984).

The economic and psychology literature has identified social preferences as an alternative to monetary incentives to motivate individual behaviors (Fehr and Fischbacher, 2002; Loch and Wu, 2008; Chen and Li, 2009; Chen and Chen 2011). Social preference is the intrinsic drive that individuals are not considering by self-interest, but concerning for their partner's welfare, reciprocating a history of a positive relationship with their partners, or intrinsic desires for a higher relative payoff for the group (Loch and Wu, 2008). Fehr and Fischbacher (2002) argue that social preferences can help understand competition, cooperation, collective action, material incentives, and important forces shaping social norms and market failures. Charness and Rabin (2002) find that social preference makes subjects more willing to sacrifice their benefits to increase the social welfare which means increasing the payoff for the low recipients. They also indicate that subjects are more concerned about the fairness among each other.

In supply chain literature, the assumption for the decision maker is that they are self-interested and rational. The goal of decision making is to maximize their own profits or benefits (Loch and Wu, 2008). Without considering such as emotion, reciprocity, status, or identity, it is not possible to adequately understand individuals' behaviors and decisions (Fehr and Fischbacher, 2002). Further, social preferences may mitigate the negative impact of self-interest for supply chain partners and increase the channel efficiency (Cui et al. 2007). Identity is proposed as a pro-social factor that can trigger trust and trustworthiness (Williams, 2001), effective resource sharing (Goette et al., 2006), and increased motivation (Camerer and Malmendier, 2007). Identity and relationships are interlinked, but identity has not fully

considered in supply chain literature. There have been calls for the behavioral operations researchers to investigate the role of identity in operational settings (Loch and Wu, 2005).

Identity includes two types: natural identity such as ethnicity (Chen et al., 2014) and gender (Solow and Kirkwood, 2002) and induced identity such as organizational identity (Mael and Ashforth, 1992) or group identity (Chen and Li, 2009). Therefore, the aim of the dissertation lies in investigating and obtaining a broader understanding of the impact of identity on buyer-supplier collaboration and performance considering two types of identity—buyer-supplier identification and gender identity. Two individual studies implementing controlled lab experiments are proposed to examine the impact of buyer-supplier identification and gender identity on collaboration and performance in a buyer-supplier relationship context. Figure 1 illustrates the relationship between two essays. Using social identity theory, the following research questions will be addressed in this dissertation:

- (1) Does buyer-supplier identification increase collaboration and performance?
- (2) How does buyer-supplier identification form?
- (3) Does gender identity increase collaboration and performance in a buyer-supplier relationship?
- (4) Does female exhibit different trust and trustworthiness compared to male?

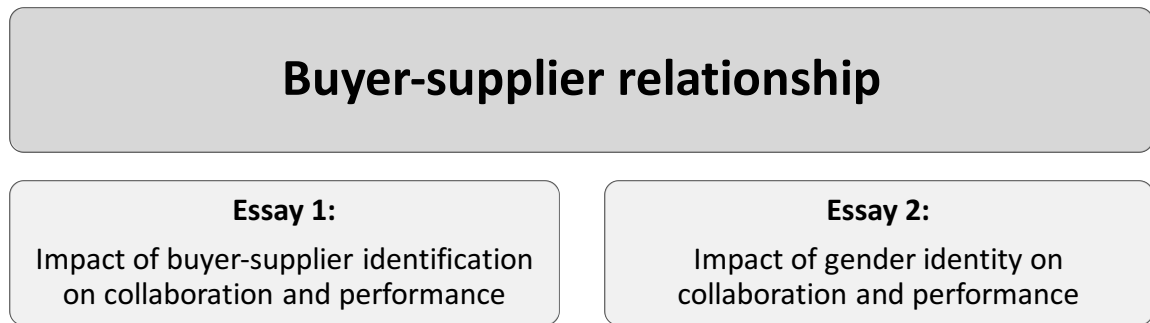


Figure 1: Dissertation Overview

Theoretical Background

Social Identity Theory

Tajfel (1972) introduces the idea of social identity to theorize how people conceptualize themselves in an intergroup context, and how a system of social categorizations “creates and defines an individual’s own place in society” (p. 293). He defined social identity as “the individual’s knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership” (Tajfel, 1972, p. 292). A group can be formed by the common definition of individuals such as gender or ethnicity, emotional involvement such as people suffered from the same problem, or daily interactions such as working in the same team (Tajel, 1974; Postmes et al., 2005). Tajfel (1974) conceptualized group in a broad way—a collection of individuals perceived themselves belonging to a social category. A group can be an organization such that an employee working in an organization perceives other employees in the same organization as “in-group” members. A group can be a team such that an employee working in a marketing team perceives other employees in the same team as the “in-group” members and employees in different teams (even though in the same organization) as “out-group” members.

Individuals have the perception of in-group and out-group when the group forms. The comparison of in-group and out-group triggers the positive feelings toward in-group members and negative evaluations toward the out-group members (Turner 1975). For example, Abrams and Hogg (1988) find that individuals show solidarity within group members and discrimination against out-group members. Tanis and Postmes (2005) find that individuals trust in-group members more than out-group members. Furthermore, individuals are more likely to exhibit the reciprocal behaviors toward the in-group members compared to the out-group members (Kramer and Brewer, 1984).

Social identity theory (SIT) assumes that we show all kinds of “in-group” favoritism behaviors and “out-group” discrimination due to the group identity formed by individuals in various social groups. Group identity is not only making individuals perceive/feel belonging to the group, but also generating cognitive, evaluative, and emotional components (Tajfel, 1979). For example, an individual knows that he is the member of a fitness club (cognitive component), and he evaluates this membership positively (evaluative component), and he feels proud of his membership (emotional component). Therefore, SIT postulates that there are four steps to form group identity: social categorization, social comparison, social identity, and self-esteem (Tajfel, 1979).

Social categorization. People tend to categorize others into groups to simplify their understanding of the world and to structure social interactions (Trepte, 2006). Tajfel and Turner (1979) summarize that “social categorizations are conceived here as cognitive tools that segment, classify, and order the social environment, and thus enable the individual to undertake many forms of social action... They create and define the individual’s place in society” (p. 40). People categorize themselves and other people into various groups. For example, a Chinese lady who

has a 3-year old boy works at CXY Company. She can categorize herself into different groups such as a female group, a Chinese association, a mom's club, or a member of CXY Company. However, even though she belongs to different groups, she may not be aware of them at the same time or evaluate them as the same importance at the same time (Tajfel, 1979). Group membership can be salient in certain circumstance to initiate behaviors. Thus, social categorization can help interpret, explain, and even justify people's behaviors (Turner 1982).

Social comparison. The first type of behaviors that is triggered by social categorization is the social comparison (Trepte, 2006). People evaluate themselves and their "salient" group membership in comparison with other groups that share similarity and proximity with them (Hinkle and Brown, 1990). SIT assumes that people evaluate social groups to which they belong, and others belong to through social comparison.

Social identity. SIT suggests that social identity is based on more or less favorable comparisons between the in-group and a relevant out-group (Tajfel, 1979). By differentiating between in-group from out-group, people generate a positive attitude toward their in-group members and relatively positive social identity in comparison to out-group. They further identify with the group that they belong to.

Self-esteem. SIT argues that the positive social identity generated from the "in-group" is the fundamental individual motivation for self-esteem (Tajfel and Turner, 1979). This idea strives to confirm aspects of their self-definition. SIT suggests that positive evaluation of one's own group membership satisfy individuals' need for their positive self-esteem (Turner et al., 1979). Social identity provides the distinctiveness among individuals and can enhance self-esteem through the positive evaluation of the membership. This can explain why people exhibit in-group favoritism and out-group discrimination.

The Difference Between Identity and Identification

The terminologies used in various disciplines about identity are different. In management and psychology literature, scholars use “organization” as the entity to represent “social groups”. Therefore, they define organizational identity as the central, enduring, and distinctive about an organization's character (Gioia, et al., 2000). There are three different forms of connection between the employee and an organization: identification, disidentification, and ambivalent identification (Anand et al., 2012). Organizational identification is defined as perceived oneness with an organization and the experience of the organization's successes and failures as one's own (Mael and Ashforth, 1992). It is the perception of belonging to the organization, and they treat themselves as part of the organization. His/her own identity has a strong overlap with the organizational identity (Dutton et al., 1994). Through identification, he/she perceives him or herself as psychologically intertwined with the fate of the organization, as sharing a common destiny and experiencing its success and failures (Tolman, 1943; Mael and Ashforth, 1992).

Organizational identification examines the connections between the individual and the organization and defines who you are (Mael and Ashforth, 1992). Organizational disidentification defines a sense of separateness and answers the question who you are not (Elsbach and Bhattacharya, 2002). People are reluctant to portray themselves as too distinctive or too indistinctive. Steele et al. (2002) find that people distanced themselves from positively distinct categorizations that carried with them unwanted stereotypes such as in the casino or tobacco companies. They are afraid that the negative image of the company impacts their own identity. For example, Lai, Chan, and Lam (2012) provide evidence by examining employees' identity in casino dealers that if the employees perceive their work to be morally dirty, they disidentify with the organization (the casino dealer).

After the good—organizational identification and the bad—organizational disidentification, there is a third type: ambivalent identification. Organizations are complex and equivocal. They, sometimes, do not define their values, goals, and beliefs clearly. Therefore, individuals can simultaneously identify and disidentify with the organization. This is called ambivalent identification. For example, an employee may identify with his organization for certain aspects—I identify with my company to become more sustainable and environmental friendly. He may simultaneously disidentify with the organization's other aspects—I disidentify with my company to be a cost-saving oriented firm.

However, in the experimental economics literature, scholars have used different terminologies to capture identification and disidentification. Akerlof and Kranton (2000) is the first to introduce identity to the economic analysis. Identity, according to Akerlof and Kranton (2000), refers to a person's sense of self. Chen and Li (2009) defines social identity as a person's sense of self-derived from perceived membership in social groups. When the economic scholars refer to the social groups, the entity is broader than the organization. Social groups can be the working teams within the organization, the organization, or the relationship between organizations. Once a person identifies with a group which means she perceived herself as part of a group, she derives self-esteem from that group membership and adopts behaviors that are consistent with the stereotypes associated with the group identity (Chen and Li, 2009). Hence, she treats other members in the same group as “in-group” (Chen and Li, 2009) and members of different groups as “out-group”. The focus of in-group and out-group is between individuals in the same/different groups.

The difference of the terminologies between management literature and behavioral economics literature is that organizational identification emphasizes on the individual identified

with the organization. However, in-group concept focuses on the individual perceived him or herself and the other individuals belonging to the same organization. An individual can identify with an organization and treat other individuals in the same organization as in-group members.

The terminology used in this dissertation is buyer-supplier identification in Essay 1. It is a perceptual and cognitive construct that refers to an individual's cognitive evaluation of the overlap between his/her own identity and the identity of an organization (Ashforth and Mael, 1989). Buyer-supplier identification is defined as perceived oneness of a supplier/buyer (the individual) with its partner's organization and the experience of its partner's successes and failures as its own in the buyer-supplier relationships (Mael and Ashforth, 1989).

This definition is distinct from organizational identification. Organizational identification emphasizes that individuals only identify with their own organization that they are working for, but the buyer-supplier identification focuses on the perspective that they also identified with their partner's organization. For example, if a person who is an employee from Proctor and Gamble, he may generate the organizational identification with Proctor and Gamble by working for the company. He may treat himself as part of the Proctor and Gamble family. In addition, if he works in the dedicated team of Proctor and Gamble that only deals with Costco's business, he may involve in many interactions with Costco's employees. Therefore, he may also generate the identity with Costco which is not the company that he is working for, but his partner's company that he is working with. The identification with Costco developed through the business interactions is called buyer-supplier identification. This buyer-supplier identification is dyadic with both suppliers and retailers.

Why Identity and Identification Matter

Identity and identification are inter-correlated with each other. Haslam and Ellemers (2005) explain that to identify with an organization which generates organizational identification, one must have an identity that is overlapped with organization's identity. Identity and identification can change not only individuals' perceptions and behaviors but also organizational outcomes.

Previous literature in psychology has shown that identity can motivate self-enhancement. According to SIT, the basic motive for identifying with a group/organization is to increase self-esteem (Ashforth et al., 2008). People identify with an organization/group to provide the basis of thinking of themselves in a positive light (Ashforth et al., 2008). For example, a person who graduated from a high prestige school may identify with the school. She may think the prestige associated with the school is reflected onto her as an alumnus (Cialdini et al., 1976) and think more highly of herself because of it.

In addition, behavioral economics literature has examined that identity/identification can alter individuals' behaviors. Chakravarty and Fonseca (2016) find that subjects exhibit in-group reciprocity and cooperation as well as display their preferences for in-group interactions. Kelly and Presslee (2016) explore group identity in the tournament context. They find that stronger group identity makes the individuals concern more about other people's payoffs in the same group and willing to make a personal sacrifice to benefits others in the same group. Therefore, the competitiveness between the in-group members is decreasing, so as the performance. These findings provide important messages to the managers that group identity can change individuals' behaviors and they have to consider it when making people work together.

Identity and identification are attractive to scholars partly because they can also increase organizational outcomes due to its social nature. Kramer (2006) finds that social identity can promote collaboration in workplace and Simon (1976) reports social identity can benefit organizational decision making. Further, identity can trigger intrinsic motivation for better task performance (van Knippenberg, 2000). Therefore, “individuals understand, accept, and employ organizational premises in their decision making and other actions, in effect becoming a microcosm of the organization such that acting on behalf of the organization is tantamount to acting on behalf of themselves” (Ashforth et al., 2008, p.337).

Foundational Literature Review

According to SIT, people can classify themselves and other people into various categories, and different individuals may utilize different categorization schemes (Mael and Ashforth, 1989). SIT assumes that “the self-concept is comprised of a personal identity encompassing idiosyncratic characteristics (e.g., bodily attributes, abilities, psychological traits, interests) and a social identity encompassing salient group classifications” (Ashforth and Mael, 1989, p. 21). Akerlof and Kranton (2000) is consistent with this classification and model identity into a natural identity that focuses on personal traits such as gender or ethnicity and induced group identity with salient group classifications. The two Essays in this dissertation will address these two types of identity and investigate how induced group identity and natural identity influence buyer-supplier collaboration and performance.

Induced Group Identity---Buyer-supplier Identification

Previous literature has documented that induced group identity can impact individuals’ behaviors. Chen and Li (2009) present a laboratory experiment that measures the effects of

induced group identity on social preference. They find that when participants are matched with an in-group member, they show an increased concern in charity and a decrease in envy. Individuals are more likely to reward their in-group members for good behaviors, and less likely to punish bad behaviors coming from the in-group members. Further, if individuals generate the in-group membership, they are more willing to choose the behaviors that can maximize the social welfare rather than only focus on their self-interests. Similarly, Chen and Chen (2011) explore the effect of induced social identity on equilibrium selection. They find that participants in the in-group sessions choose significantly higher effort levels than those in the control and out-group sessions, while participants in the control and out-group sessions do not choose significantly different effort levels in the enhanced sessions. When they perceived more significant salient on group membership, participants in the in-group sessions choose significantly higher effort levels. Moreover, Hargreaves Heap and Zizzo (2009) implement a trust game and provide evidence that individuals trust their in-group members more than outgroup members because of the discrimination of the outsider. They also find that group membership can provide psychological benefits, but these psychological values can introduce social inertia. Charness et al. (2007) find that compared to isolated individuals, salient group membership significantly increases the aggressive stance of the hosts and tends to reduce that of the guests. Further, the in-group membership can significantly increase non-selfish cooperation in prisoner's dilemma game (Goette et al., wp).

In management and psychology literature, scholars have reported the impact of identity in various settings. Tavares et al. (2015) suggest that organizational identification plays a moderating role between perceived organizational support and employees' turnover and extra-role behaviors by using the data from a large Portuguese private financial services' firm. They

find that when employees have high organizational identification, they are less likely to leave the organization if they perceive to receive the organizational support and more likely to exhibit extra-role behaviors. Zavyalova et al. (2016) examine the organizational identification in a negative context. They suggest that if a negative event happened to the high-reputation firm, the low identification stakeholders are less likely to support the organization.

In the operations literature, to our knowledge, there are only two papers that explore the effect of identity in the operations management context. Corsten et al. (2011) use a similar terminology—supplier-to-buyer identification which only examines the fact that only suppliers identify with retailers in the firm level. They find that supplier-to-buyer identification leads to higher trust, information exchange, and innovation through a survey research with perceptual measurements. Papier et al. (working paper) bring the concept of group identity between teams within a firm into supply chain forecasting and ordering context. They find that group identity increased demand planners' effort investment which also increases the whole supply chain performance.

Natural Identity

In comparison to induced group identity, natural identity is another type of identity that can influence individuals' behaviors. Natural identity includes gender and ethnicity (Papier, et al., wp), but in this dissertation, Essay II only focuses on gender identity.

Previous literature has shown that females and males are different regarding risk preference, social preference, and competition. For example, Byrnes et al. (1999) compared male and female's risk-taking tendencies by conducting a meta-analysis of 150 studies. They find that females behave/perceive differently than males in certain topics such as intellectual risk taking

and physical skills compared to smoking. These differences are particularly pronounced when it comes to physical or life-threatening risks (Hersch, 1997). In addition, gender differences in risk propensity have been observed in another context such as financial decision-making or investment decisions.

Experimental economics have also explored the gender difference in various games. Solow and Kirkwood (2002) provide evidence that gender has a significant impact on the contribution of public goods. They find that males contribute more than females. On the contrary, Gneezy et al. (2003) find that women are more likely to collaborate with the group members to increase the group efficiency, but males are more likely to work individually. When there is a third-party involved, females are more likely to collaborate if the other female observes her behavior in a prisoner's dilemma game (Charness and Rustichini, 2011). There are several studies that examine competitive behaviors between men and women. The findings are consistent across studies that males are more likely to involve in a competitive environment, but females are more likely to choose team-work environment (Gneezy et al., 2003; Gneezy and Rustichini, 2004; Datta Gupta et al., 2005). Croson and Gneezy (2008) review the literature of gender difference and provide the following explanations that can reveal the reasons for gender differences. They argue that women hold strong emotions compared to men and when they experience risky choices, their emotion exhibits dominant, and the utility of choice would decrease. Also, men are overconfident about their success, and therefore, they are more likely to make risky decisions. Further, women and men have different views toward risk. Males treat risk as a challenge, but females think it is a threat. All these reasons can explain why females are more risk averse than male. In addition, females are more context-driven, and they make decisions and exhibit behaviors according to the situation. However, males are more context-

neutral, and their decisions and behaviors are more consistent across context. These reasons can explain why females are more inequity averse, reciprocity, and less competitive.

Structure of The Dissertation

To address the four research questions outlined in the introduction, two individual Essays are proposed. Essay 1 follows the stream of induced group identity and is trying to understand the impact of buyer-supplier identification which refers to perceived oneness of a supplier/buyer with its partner's organization and the experience so its partner's successes and failures as its own (Ashforth and Mael, 1989) on supply chain discretionary collaboration and performance. Essay 2 investigates another stream of identity—gender identity. It is examining the influence of gender composition on trust, trustworthiness, collaboration, and performance in buyer-supplier relationships.

Essay 1

The aim of this essay is to explore how buyer-supplier identification impacts supply chain collaboration and performance. Also, it is trying to understand the formation and foundation of buyer-supplier identification. Using social identity theory, a conceptual framework is developed with the hypotheses. To test the hypotheses, I conduct a controlled laboratory experiment by using different ways to manipulate buyer-supplier identification. Consistent with the literature, this Essay uses minimum group paradigm and problem-solving task to create group identity between buyers and suppliers. I also mimic the collocation phenomenon in the experiment to examine whether physical collocation is an efficient method to enhance buyer-supplier identification and understand the reason that collocation exists between buyers and suppliers in practice.

Controlled laboratory experiment provides several benefits to this study. First, it can present the causal effect of independent variables (buyer-supplier identification) on the dependent variables of interest (collaboration and performance) (Tokar, 2010). For the identity research, there exist various causal links between constructs. For example, Mael and Ashforth (1992) propose that inter-organizational competition can enhance organizational identification, but intra-organizational competition can reduce the organizational identification. This evidence shows that competition/collaboration can also impact identity. To avoid endogeneity problem, a controlled laboratory experiment is a more appropriate method to test the causal relationship. Second, to ensure that only the variables of interested are manipulated and to rule out potential confounds, this study has the careful development of experimental manipulations (Perdue and Summers, 1986; Knemeyer and Naylor, 2011).

This study has four treatment groups with increased levels of buyer-supplier identification from minimum group paradigm which is using the minimal way to create buyer-supplier identification, to the problem-solving which includes online and face-to-face problem-solving task to enhance buyer-supplier identification, to collocation that is the most advanced way to further enhance buyer-supplier identification. A control group serves as the baseline. The experimental task implemented in this study is a forecasting and production game that a subject plays a role of a retailer that forecasts for the future customer demand according to his/her private forecast information. Then he/she makes a forecast report submit to his/her partner--a supplier-- the role is played by another paired subject. Suppliers need to choose a production plan according to the forecast report that the retailer gives to him. Finally, the demand will be realized and profit obtained for both suppliers and retailers. This game is adapted from Ozer et al. (2014).

Essay 2

Essay two focuses on the impact of gender composition on collaboration, and performance in buyer-supplier relationships. This Essay is also trying to understand the difference between trust and trustworthiness between females and males. Previous literature has extensively explored the gender difference in various aspects, but there is a lack of research on gender composition especially when gender identity is salient. This Essay is trying to advance our understanding on whether the heterogeneous team will outperform compared to the homogeneous team and in which level team member trusts their partners.

A controlled laboratory experiment is conducted to answer the research questions. Consistent with Essay 1, Essay 2 uses the same forecasting and production game.

Contributions and Implications

Contributions and Implications of Essay 1

This research contributes to supply chain management literature in three ways. First, it develops and introduces a new terminology into supply chain management literature. To our knowledge, there is only two research in operations management literature that explores the role of identity. Papier et al. (wp) focus on the group identity between demand planner and production planner who identified with each other in the intra-organizational level. Corsten et al. (2012) examine the influence of identity in the inter-organizational level that a supplier firm identified with a retailer firm. Those two studies are either in the intra-organizational level or the inter-organizational level. However, the buyer-supplier relationship is dyadic and individual managers purchase the product and produce the product. Thus, our definition well-captured this phenomenon and explores the effect of buyer-supplier identification between individuals.

Second, we propose buyer-supplier identification is a non-economic method to trigger discretionary collaboration. It enables firms to be more willing to collaborate and sacrifice their own profits to benefit both their peers and the supply chain. This would avoid the problem of incomplete contract and the negative impact of monetary incentives.

Third, this research is the first to employ a controlled laboratory experiment to explore the formation and foundation of buyer-supplier identification. It sticks with the previous experimental economics literature and psychology literature that minimum paradigm is efficient enough to form identity and shared experience can enhance identity. However, this research also mimics the real-world phenomenon—collocation—to test whether collocation can create stronger identification between employees in a supplier company and the retailer's company or vice versa. This helps us to understand the behavioral benefits of collocation beyond the operational benefits.

This study also offers managerial implications for practitioners. First, it explains the behavioral benefits of collocation. Even though collocation is expensive for the suppliers, but suppliers, in fact, benefits more from the identification generated through collocation. Therefore, beyond operational benefits such as more information sharing and faster decision-making process, collocation can also bring behavioral benefit—buyer-supplier identification.

Second, collocation is one of the most efficient ways to create strong buyer-supplier identity. It encourages retailers and suppliers work closely with each other. If suppliers are willing to establish a high-quality relationship with their major retailers, collocation is one of choices.

Contributions and Implications of Essay 2

Essay two offers two-fold contributions to supply chain management literature. First, this study is the first to explore gender composition between suppliers and retailers in the literature. It treats employees in the buyer-supplier relationships as the team. Gender is the existing identity for individuals, by exploring the effect of natural identity, the results can easily apply to the real-world settings. Previous literature has documented various methods to promote collaboration from the contract, to monetary incentives, to non-economic factors, but this study is from a natural identity perspective to promote collaboration from the similarity/difference among the group members. Second, by understanding gender differences in trust and trustworthiness between different gender composition of suppliers and retailers, this Essay can conclude that whether individuals do not exhibit collaborative behavior not because they are not willing to, but because they don't believe their partner has the ability to complete the work.

In addition, this study will offer several implications to managers. First, when forming working relationships, managers may want to consider the gender of the employees in their partner's company to make the relationship more efficient and effective. Second, if the gender composition in the relationship is not ideal, he/she may consider not to make the gender identity of salient in the working environment. Third, gender composition provides a non-economic perspective to managers to encourage collaboration and better team performance.

Dissertation Outline

Following the introduction in chapter one, chapter two focuses on how buyer-supplier identification impacts supply chain collaboration and performance. Next chapter three constitutes the second type of identity—gender identity. It explores the influence of gender composition on

supply chain collaboration and performance and also whether females exhibit difference in trust and trustworthiness compared to males. Lastly, chapter four will conclude this dissertation by summarizing the two essays and their respective findings and contributions.

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II. ESSAY 1

What Leads to Higher Collaboration in Buyer-supplier Relationships? The Role of Buyer-supplier Identification

Introduction

“Toyota helped us dramatically improve our production system. We started by making one component, and as we improved, [Toyota] rewarded us with orders for more components. Toyota is our best customer.” —*Senior executive, supplier to Ford, GM, Chrysler, and Toyota, July 2001* (Liker and Choi, 2004)

Sociologists, social psychologists, and organizational theorists have long recognized the importance of collaboration within groups and organizations (Fine and Holyfield, 1996; Hackman, 2002; Turner, 2014; Kremer, 2006). With more than 50 percent of manufacturers’ revenues spend in their supply chains (Tarabori, 2011), research in operations management has also emphasized the value of buyer-supplier collaboration over the past two decades. The collaborative buyer-supplier relationship can be viewed as firms’ competitive advantage (Carr and Pearson, 1999; Ellram, 1991; Krause, 1999) which benefits both supplier and buyers (Lyons et al., 1990). Collaboration can reduce manufacturing and labor costs, improve quality, and increase R&D effectiveness (Lyons et al., 1990). For example, Starbucks partnered with Barnes and Nobles bookstores to provide in-house coffee shops, benefiting both themselves and retailers. Hewlett-Packard and Disney have a long-standing alliance that HP’s IT architecture and engineers support Disney’s virtual attraction system—SPACE to create Disney’s most technologically advanced attractions. Collaboration becomes one of the most important factors that determines firms’ success in the nowadays competitive world.

Recognizing its importance and benefits, scholars in various disciplines have afforded considerable attention to identify the foundations or bases of collaboration. Corsten and Kumar (2005) find that trust between manufacturers and retailers can promote supplier’s capability development which results in collaboration with the focal retailer. Simonin (1997) suggests that experiencing collaborative know-how with other firms in the strategic alliance can improve the

benefit of collaboration. Hofer et al. (2012) provide evidence that both trust and commitment can improve cooperation in the logistics outsourcing relationships.

Three theories—transaction cost economics, resource dependence theory, and social exchange theory-- provided particular interests in explaining the antecedences of collaboration. Traditional economics assumes that people are self-interested and rational agents (Williamson, 1989). Resource dependence theory and social exchange theory propose that collaboration is built on either resource exchange, or common goals, or mutual benefits. In the decentralized supply chain, both suppliers and retailers have incentives to adhere to their own goals to maximize their profits rather than concerning the supply chain performance as a whole.

To align the goals of different echelons in the supply chain, the contract is one way to achieve efficiency (Cachon and Lariviere, 2005). Giannoccaro and Pontrandolfo (2002) provide the evidence that the supply chain contract can make the independent supply chain partners work coherently among each other in the decentralized setting as if the supply chain operates in a centralized setting. Tsay and Lovejoy (1999) report that the quality flexible contract can improve the supply chain performance by dampening the order variability and reducing the “bullwhip” effect. Monetary incentives also play a significant role to achieve supply chain efficiency (Cachon, 2003).

The contract is often an inevitable element of transactional relationships, but Maloni and Benton (2000) argue that using the contract to govern the relationship is not in the best interest of the involved parties. The contract is incomplete in most cases, and it is costly to develop a formal and complete contract. Tsay (1999) examines the decentralized supply chain coordinating with the quality flexible contract. He finds that the quality flexible contract cannot guarantee

efficiency and that inefficiency leads to retailer's over-forecasting or simply making decisions based on local information rather than global perspective.

Other than contract, Pisano and Verganti (2009) suggest that monetary incentives can attract external collaborators, but monetary incentives have negative behavioral consequences such as crowding out intrinsic motivation (Frey and Jegen, 2000), deception (Gneezy, 2005), dishonesty (Mazar et al., 2008), or decreasing trust (Malhotra and Murnighan, 2002). Due to incomplete contracts and problems of monetary incentives, the efficiency of an organization heavily depends on individuals' willingness to take non-selfish actions, such as cooperating when there is no incentive to do so or punishing inefficient actions by others. Therefore, it is necessary to move away from traditional and formal contracts or monetary incentives but to emphasize more on informal factors that can motivate voluntary behaviors.

The economics literature has identified social preference as a non-economic perspective to replace monetary incentives to change individual behaviors. Akerlof and Kranton (2000) suggest that simply being able to identify with a group is an important source of individual well-being. Smith (1975) argues in a similar fashion that people enjoy the "special pleasure of mutual sympathy" that comes from belonging to a group. A group membership matters for individuals in the sense that it can affect their behaviors which have been shown in experimental economics literature in various types of games. Charness et al. (2007) and Goette et al. (2006) provide the evidence that group identity can impact individual behaviors in the prisoner's dilemma game. Tan and Bolle (2007) suggest that group identity can increase subjects' contributions and decrease their free-riding behaviors in the public goods game. Hargreaves and Varoufakis (2002) and Binmore et al. (1985) find that group identity plays a significant role in bargaining settings. However, there is a lack of research to investigate identity issues in operations management

settings. Therefore, the current study experimentally investigates how buyer-supplier identification as one type of social preference influences discretionary collaboration and supply chain performance.

Buyer-supplier identification refers to the perceived oneness of a supplier/buyer with its partner's organization and experience of its partner's successes and failures as its own (Ashforth and Mael, 1989). The basic assumptions of TCE, RDT, and SET focused on either taking actions to reduce transaction cost or interacting with others to gain desired material resources. However, according to those theories, motivations already outlined which lead people to seek to minimize their own cost or maximize the resources gained by their organizations (Tyler, 1999). Different from TCE, RV, and SET, buyer-supplier identification reflects the antecedents of discretionary behavior—that is, the behavior that occurs without a direct connection to rewards or costs. Cooperative behaviors are especially valuable when they occur voluntarily, with people acting based on their internal values, rather than upon judgments of potential gains or losses. Such voluntary cooperative behaviors occur without the use of organizational resources for their implementation because the motivation for those behaviors comes from people's internal values—that is, from what people want to do or feel they ought to do.

The purpose of this study is to advance the understanding of the role of buyer-supplier identification in operations management context. This study offers several contributions to supply chain management literature and operations management literature. First, it develops and introduces buyer-supplier identification, the individual level construct, to operations management literature. Management literature has used the similar construct—organizational identification. However, this construct only focuses on the employee that identified with his/her own company. In addition, Corsten et al. (2012) used similar construct—supplier-to-buyer

identification. They focus on the inter-organizational relationship that a supplier (firm) identified with a retailer (firm). However, the construct in this paper, buyer-supplier identification, is the individual-level construct that emphasizes on the employee who works for a supplier/retailer that perceives oneness with the retailer's firm. Second, it proposes buyer-supplier identification as an alternative motivation to monetary incentives to promote discretionary collaboration and supply chain performance. I intend to advance the understanding that whether buyer-supplier identification can trigger altruistical behaviors that either the supplier/retailer (individuals who work for the supplier/retailer firm) are willing to sacrifice their own interests to benefit their partner and the whole supply chain. Third, to my knowledge, this is the first research to implement a controlled laboratory experiment to explore the effect of buyer-supplier identification on discretionary collaboration and supply chain performance to build the causal link of the antecedence of collaboration and performance in operations management literature. In addition, this experiment advanced the understanding of the formation and foundation of buyer-supplier identification.

The rest of the paper is structured as follows: In the next section, I use social identity theory to explain how buyer-supplier identification forms. Next, a section with theoretical justifications for the hypothesized relationships is presented. Following the hypotheses, I present the details of the controlled laboratory experiment and results. In the last section, I discuss the conclusions and implications of this research.

Literature Review

According to social identity theory, particularly in management literature, organizational identification describes an individual's perception of belongingness or oneness with a particular organization and their experiences of the organization's successes and failures as their own

(Ashforth and Mael, 1989; Mael and Ashforth, 1992). Social identity theorists have argued that organizational identification has formed in three steps: first, people classify themselves and other people into various social categories such as organizational membership, religious affiliation, gender group, or age cohort (Tajfel and Turner, 1985). Individuals can belong to various categories, and people may utilize different categorization schemes when they put themselves and other people into groups (Ashforth and Mael, 1989).

Second, individuals can use social classification to locate or define themselves in the social environment by using a personal identity encompassing idiosyncratic characteristics (for example, bodily attributes, abilities, psychological traits, interests) and a social identity encompassing salience group classification (Ashforth and Mael, 1989). For example, a woman who has a kid perceives herself belonging to a female group, and also a member of Mom's club.

Third, people compare the group they belong to with similar groups that they do not involve in. This in-group and out-group comparison enables the selection and evaluation of the relevant relational attributes (Tajfel, 1972). As indicated before, individuals have multiple group identities, but not all the group memberships are salient at the same time. Group identity is salient in certain situations to certain individuals (Tajfel, 1959). Morland (1969) find that individuals in the United States are more sensitive to skin color than those in Hong Kong. Giles and Powesland (1976) report that individuals in French, Canada, Wales, and Belgium are more sensitive to languages and use languages to classify themselves and others into various groups.

Group formation and group identity generation can create the in-group and out-group comparison. However, it does not indicate that in-group members compare themselves with every cognitively available element to out-group members. They only compare out-group that is

relevant and proximate to them (Tajfel, 1972). This comparison creates a favorable bias toward the group to which they belong (Chen and Li 2009).

Tajfel (1982) states that the final stage to achieve identification is that individuals should have the frequent connection with the group, be aware of the membership of the group, and evaluate the membership of the group.

Social identity theory was developed to understand the psychological basis for intergroup bias and discrimination (Chen and Li, 2009). Previous literature has found that social identity impacts individual behaviors. Social identity has been linked to in-group favoring actions, collective actions, monetary donation, and loyalty. For example, Brewer (1979) reviews the experimental research in psychology literature on intergroup discrimination in favor of one's own group. Results suggest that intergroup competition and status differentials can affect the salience of distinctions between in-group and out-group. These differences create the in-group bias. Further, the enhancement of in-group bias is more related to the increased favoritism toward in-group members than to increased hostility toward out-group members. Blader (2007) conducts a survey research and finds that individuals develop higher level of identification with the specific union-organizing group compared to those who identified with cohort group. Also, this identification with union-organizing group has a stronger impact on individual positions regarding union certification. In terms of monetary donations, Mael and Ashforth (1992) suggest that the group identification with the alma mater can increase individuals' hypothetical outcomes of making financial contributions, willingness to advise one's offspring or others to attend to college, and participating in various school functions.

Experimental economics literature has similar findings. Chen and Chen (2011) explore the effect of induced social identity on equilibrium selection. They use different ways to create

different levels of group identity and find that when group identity is in the low level, participants do not choose significantly different effort levels among in-group, out-group, and control group treatments. However, with the increased level of group identity, participants in the in-group sessions choose significantly higher effort levels than those in the control and out-group sessions, while participants in the control and out-group sessions do not choose significantly different effort levels. Therefore, the salience of group identity can increase individuals' effort levels toward their in-group members. Chen and Li (2009) find that subjects have more charity concerns and less envy toward their in-group members. In the meantime, they are less likely to punish their in-group members who have bad behaviors. Bernhard et al. (2006) explore the social identity with the third-party presence in the dictator game. They find a much higher willingness to punish norm violators if the victim of the violation belongs to different groups. If the punisher and recipient belong to the same group, dictators punish less. Simpson (2006) finds that first movers in the sequential dilemmas game are equally likely to cooperate with in-group and out-group members. Given cooperation by the first mover in a sequential game, the second mover is more likely to cooperate with in-group than out-group members. Charness et al. (2007) confirm the effect of group membership on behaviors and also provide the evidence of group identity formation. They argue that simply writing "Row" on a board or allowing people to choose colors is not sufficient to induce groups which motivated behaviors; more is needed to create groups such as an audience or common group payoffs.

In addition, in operations management literature, there are only two studies that explore the impact of identity on supply chain decision making and supply chain performance. Corsten et al. (2011) suggest that supplier-to-buyer identification leads to higher trust, information exchange, and innovation through a survey research with perceptual measurements. Papier et al.

(working paper) bring the concept of group identity between teams within a firm into supply chain forecasting and ordering context. They find that group identity can increase demand planners' effort investment which also increases the whole supply chain performance. While the previous experiments have demonstrated when and to what extent social identity affects individual behaviors in various types of games in different disciplines, lack of the studies estimates its effects in the operations context. There is a call to investigate the effect of group identity in operations management context (Loch and Wu, 2008) and the purpose of this research is to address this call to investigate the influence of buyer-supplier identification on discretionary collaboration and the whole supply chain performance.

Combining with management, psychology, behavioral economics, and operations management literature, buyer-supplier identification, in this research, is defined as the perceived oneness of a supplier/buyer with its partner's organization and experience of its partner's successes and failures as its own (Ashforth and Mael, 1989). According to this definition, this is an individual-level concept and organization is the entity that represents the group. In particular, an employee who works for the supplier's company generates the same identity with the retailer's company and identifies with the retailer's company. Similarly, an employee who works for the retailer's company generates the same identity with the supplier's company and identifies with the supplier's company. He/she perceives the oneness of retailer and supplier companies, and he/she perceives that he/she belongs to his/her partner's company. Buyer-supplier identification compels either a buyer or a supplier to sometimes sacrifice his/her own interests for the benefit of his/her partner—strong feelings are aroused, such as fondness, caring, sentimentality, and love, which may be sufficiently strong for the buyer and supplier to altruistically give up benefits to the relationship (Loch and Wu, 2008).

In conclusion, previous literature has shown that organizational identification can increase the support of the organization (Mael and Ashforth, 1992), cooperation (Dukerich, et al., 2002), performance (Randel and Jaussi, 2003; Hekman et al., 2009), creativity (Farmer et al., 2003), and perceived solidarity (Willer et al., 2012). Similarly, experimental economics has the comparable findings. They find that if individuals generate identity with their group members, they are likely to be more charity, less envy, more concerned about social welfare maximization (Chen and Li, 2009), more altruistic (Bernhard et al., 2006), and have higher level of trust (Hargreaves-Heap and Zizzo, 2009). Therefore, I assume that buyer-supplier identification may have the similar impact on supplier chain outcomes.

Research Hypotheses

Effects of Buyer-Supplier Identification on Discretionary Collaboration

Discretionary collaboration is defined as behaviors performed by an employee who works for a supplier/retailer to help his/her partner's company; These behaviors contribute to the effective functioning of the buyer-supplier relationship, are outside formal contractual obligations, and are performed without expectation of direct reward (Guskey and Heckman, 1994). In the buyer-supplier relationship, various behaviors are expected from each party. For example, retailers are expected to share forecasting information with the supplier to help them better plan for production. Similarly, suppliers are expected to provide product information or make a delivery. A formal contract can define roles and responsibilities performed in the relationship. However, Wuyts (2007) has observed that suppliers or retailers do more than what is formally required to help out their partners and add value to the relationship.

Previous literature has found that satisfaction with their partners' performance, relational bonds, individuals' attributes, switching cost, and role formalization can shape discretionary collaboration (Wuyts, 2007; Heckman and Guskey, 1998). Kelman (1958) proposes that social identity is an important internal value in shaping individuals' behaviors. When buyer-supplier identification forms, it reduces the differentiation between the supplier firm and the buyer firm which increases the consideration of collective benefits rather than individual decision making (Brewer, 1979). Both suppliers and retailers perceive that they belong to one entity rather than two different organizations. It shifts either the supplier or the buyer's focus from the self to his/her partner and the relationship.

Buyer-supplier identification can compel individuals to sacrifice their own interests for the benefit of the group due to the in-group favoritism. Strong feelings are aroused toward their in-group members, such as fondness, caring, sentimentality, and love. These positive emotions may be sufficient enough to trigger group members to give up benefits to peers (Loch and Wu, 2007). Therefore, as Hogg and Abrams (1988) noted, attraction increases with the formation of identification because it arouses a favorable bias toward their members by regarding them as relatively trustworthy, honest, and cooperative (Brewer, 1981). Therefore, the depersonalized or group-based trust is formed through this process (Brewer, 1981). Trust based on group identification facilitates discretionary collaboration because it reduces the fear that other group members will exploit cooperation by not reciprocate it. They treat collaboration to benefit not only the relationship but also themselves. Therefore, this study offers the following hypothesis:

Hypothesis 1: The higher the level of buyer-supplier identification, the higher the level of discretionary collaboration.

Effects of Buyer-Supplier Identification on Performance

When existing buyer-supplier identification, suppliers and buyers perceive overlap goals, values, and beliefs, and they also have shared language to facilitate communication (Crosten et al., 2012). Therefore, they are more likely and willing to share information with each other to smooth the communication and reduce misunderstanding and information asymmetry due to the perceived oneness generated through buyer-supplier identification. Previous research has shown that individuals with high organizational identification tend to make more contributions to their working teams or firms (van Knippenberg et al., 2004). It is because identification leads individuals to perceive themselves in terms of the characteristics they share with the organization (van Knippenber, 2000). As a result, individuals tend to expand more effort on behalf of the organization (van Knippenberg et al., 2004). Due to the higher effort level they put, employees are more motivated to achieve goals of their working organization (van Knippenberg, 2000). Since employees are more motivated and put more effort, the performance is more likely to be improved.

In addition, buyer-supplier identification makes suppliers and buyers experience the supply chain profit as self-interest (Leeuwen and van Knippenberg, 1999). Buyer-supplier identification can also motive suppliers and buyers to exert effort on the task, especially for members who are not taken others' interests into account. The performance is also affected by expectations about the effort other members would invest in the group task. Higher expected effort from others would result in higher own performance. High buyer-supplier identification motivates both parties to perform more or less irrespective of the effort and performance they expect from their fellow group members. Therefore, this study hypothesizes that buyer-supplier identification can lead to better performance.

Hypothesis 2: The higher the level of buyer-supplier identification, the higher the level of supply chain performance.

Methodology

Experimental Design

The experimental design addresses the following objectives: to determine the effects of buyer-supplier identification on collaboration and joint performance in buyer-supplier relationships. Furthermore, it evaluates different ways to create buyer-supplier identification in the laboratory, to explore the formation of identification, and to investigate the foundation of what buyer-supplier identification is.

There are different ways to shape identity. Minimal group paradigm (MGP)—groups are created using trivial and sometimes almost meaningless tasks—was first used by Tajfel et al. (1971) to test social identity theory in the psychology literature. It creates groups by using trivial and sometimes almost meaningless tasks and is one of the most frequent ways employed to form groups. For example, Hertel and Kerr (2001) create groups with an alleged “test of cognitive representation styles”. Otten and Wentura (1999) assign their subjects to either concave or convex groups in their first experiment and either figure or ground groups in the second experiment. In the experiment economics literature, scholars use the similar scheme to form groups. For instance, Chen and Li (2009) assign groups by painting preferences. Chen and Chen (2011) name two different groups as red or green. Those studies indicate that minimum group paradigm is sufficient enough to create in-group favoritism.

Second, shared experience is another way to form identity. Neville and Reicher (2011) report that collective experiences could make people feel shared identity. Nickerson and Zenger

(2004) argue that problem-solving with the other firm can generate knowledge and capacity for the relationship which could help both firms to have shared identity. Similarly, Kogut and Zander (1996) suggest that social interactions in groups facilitate not only communication and coordination but also learning. It is through learning that coordination and communication are facilitated through identity.

Lastly, physical presence may also generate identity. Short et al. (1976) is the first to mention social presence theory and postulate that social presence is a critical factor in communication and define social presence as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (p. 65). Social presence has two dimensions: intimacy (Argyle and Dean 1965) and immediacy (Short et al. 1976).

Short et al. (1976) provide the evidence that social presence can create a higher level of intimate due to shorter physical distance, more eye contact, and more smile. For example, compared to audio-only communication, television makes greater intimacy due to more visual cues such as eye contact, smile, or body languages (Gunawardena 1995). Second, immediacy is a measure of the psychological distance that a person perceives between himself/herself and the other person/people that he/she is communicating with. Immediacy can enhance social presence. Therefore, with the social presence, individuals may feel more connections with their group members and create a higher level of buyer-supplier identification.

According to the above discussion, there are different ways to create buyer-supplier identification. Therefore, this experiment employed four treatments and one control treatment to test the impact of buyer-supplier identification on collaboration and performance. Two subjects

randomly and anonymously paired to play the role of either the supplier or retailer. The matched group members are in the fixed role in the 23 periods.

In the control treatment, each subject gets an envelope which contains a white index card with a subject ID (Chen and Chen2011). There is no information in the instruction that indicates the buyer and supplier have previous interactions. The first experimental treatment (minimum group) implies a relationship in the instruction. Each subject gets an envelope which contains a white index card with a subject ID, company names (PreOcean company and OriLava company), and a company logos. In the experimental task, I also put the join company names and logos in the subjects' decision screen. This process initiates a relationship, which is reinforced by the following written paragraph in the instruction "People work for the team in PreOcean Company that only works with OriLava Company's business. The two companies work closely together and collaborate on supply chain issues. They share information to help with demand forecasting and replenishment of inventory".

The second experimental treatment is to make identification more salient through an online problem-solving task (Enhanced group 1). Other than the previous manipulation, subjects do a pre-experiment problem-solving task—a painting task that adapted from Chen and Li (2009) only with their matched partners. Before the real experimental task, subjects are provided with a folder that has five pairs of paintings. In each pair of the paintings, there is one painted by Paul Klee and the other one is painted by Wassily Kandinsky. The five pairs of paintings include the key indicating which of the two artists painted each of the ten paintings. The last two pages of the folder are shown two final paintings and subjects are told that each of them is painted by the same artist. The subjects are then asked to determine, within ten minutes, which artist painted each of these final two paintings. Subjects can use an online chatting system to help and get help

only with their assigned partners, but they are not required to make contributions to the online communication. Subjects make individual decisions and are not required to tell their partners what decisions they have made. For each correct answer, a subject earns 50,000 additional experimental dollars. Subjects are notified what the correct answers were until the end of the experiment when they got their payment (Chen and Li, 2009).

To test the difference between an online shared experience and face-to-face shared experience, we have the third treatment (Enhanced group 2) that subjects solve the painting task face-to-face rather than online communication after the minimum group paradigm manipulation. Before the real experimental task, subjects meet their matching partner in one of the breakout rooms in the laboratory and solve the same painting problem presented in the above. They can communicate with each other face-to-face to help and get help to answer the questions within 10 minutes.

The fourth treatment is to mimic the phenomenon of collocation in the real setting, and I named it as the advanced group. Beyond the joint company names and logos and face-to-face problem-solving task, subjects do the real experimental task in front of each other. They can see each other's face, but they cannot see their partner's screen which is the decision. No communication is allowed in this treatment.

Participants

A total of 284 participants is recruited from a large southern university, mostly undergraduates, from various fields of study who volunteered through an online recruitment system from a database of 3500 students at a medium-sized university in the US. The task was incentivized with cash based on performance. Participants are paid their actual earnings after all

subjects finish the post-experiment questionnaire, privately and in cash. They received an initial endowment of \$5.00 for showing up at the lab. In addition, the average payment for the approximately one hour task is \$11.11. The summary of the treatments is shown in Table 1.

Table 1: Summary of the treatments

Treatments	Joint company names and logos	Shared experience online	Shared experience face-to-face	Physical collocation	# of subjects
Control group	N/A	N/A	N/A	N/A	56
Minimum group	Yes	N/A	N/A	N/A	58
Enhanced 1 group	Yes	Yes	N/A	N/A	60
Enhanced 2 group	Yes	Yes	Yes	N/A	52
Advanced group	Yes	Yes	Yes	Yes	58
Total					284

Note. Half the subjects play the role of supplier and the other half play the role of retailer.

Experimental Procedure and Software

Experimental procedure

All 16 experimental sessions followed the similar protocol. Participants arrive at the computer lab at the designated time and are randomly and anonymously assigned to the role of either supplier or retailer according to the index card they draw at the beginning of the experiment. In the control and minimum treatments, paper-based instruction including two parts—general instruction with basic lab rule and payment structure and forecasting task instruction is provided to the subjects. After finish reading the instruction, subjects watch a video which highlights the important component of the instruction followed by the forecasting task. In the enhanced group 1 treatment, subjects do the pre-experiment painting task before the forecasting task and their instruction includes the painting task instruction between the general and forecasting task instruction.

In the enhanced 2 and advanced treatments. The procedure is slightly different. After subjects draw the index card at the beginning of the experiment, they go to the breakout room in the laboratory for the pre-experiment painting task. In the breakout room, the instruction including general and painting task instructions are provided. After finishing the painting task, subjects move to the computer lab for the forecasting task. Forecasting task instruction is provided in the computer lab. After reading the forecasting task instruction, subjects watch a video which highlights the important component of the forecasting task. The only difference between enhanced group 2 treatment and advanced treatment is that subjects sit in front of each other when they do the forecasting task in the advanced group treatment. The forecasting task lasts 20 periods with three practice rounds for all the treatment.

At the end of the experiment, all the subjects are asked to complete a post-experiment questionnaire with the manipulation checks and individual differences as control variables.

Tasks and software

The forecasting task is adapted from Ozer et al. (2014). Consider a two-tier supply chain with one supplier and one retailer. The supplier produces a product and sells to the retailer, who then sells the product to the end customers. Because of retailer's proximity to the customers, the retailer has better demand forecast information. The supplier wants to solicit this information to plan his production before demand is realized. In this paper, the final customer demand is random and modeled as $D = \xi + \epsilon$. The notion of ξ represents the retailer's private forecast information since he/she is close to final customers. It is deterministically known to the retailer, whereas the supplier only knows that it is a random variable distributed on $[\underline{\xi}, \bar{\xi}]$ with cumulative distribution function (c.d.f.) $F(\cdot)$ and probability density function (p.d.f.) $f(\cdot)$. The

notation of ε is the market uncertainty of the product. Both parties only know that it is a zero-mean random variable distributed on $[\underline{\varepsilon}, \bar{\varepsilon}]$ with c.d.f. $G(\cdot)$ and p.d.f. $g(\cdot)$. I assume $\underline{\xi} + \underline{\varepsilon} > 0$ to ensure that demand is positive.

To sequence of the task is as follows: (i) The retailer observes his /her private forecast information ξ and submits a report $\hat{\xi}$ to the supplier; (ii) the supplier receives the report $\hat{\xi}$ and produces Q units of the product at the unit cost of c ; (iii) demand D is realized and the retailer purchases $\min(D, Q)$ from the supplier at a unit whole-sale price of w ; (iv) the retailer sells the product to the end customers at a unit retail price of r and both parties' profits are realized.

Similarly as Ozer et al. (2014), we assume $r \geq w \geq c \geq 0$ to ensure profitable production.

Given Q and ξ the supplier's and retailer's expected profits are

The supplier's expected profit: $\Pi^S(Q, \xi) = w \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q) - cQ$

The retailer's expected profit: $\Pi^R(Q, \xi) = (r - w) \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q)$

The profit calculation indicates that the expected profit functions that the retailer does not incur any direct cost by reporting, $\hat{\xi}$ is not a binding order, and whether $\hat{\xi}$ equals ξ cannot be perfectly verified even ex-post due to the existence of ε . Therefore, the retailer's report is costless, nonbinding, and nonverifiable, known as “cheap talk” in the literature (Crawford and Sobel 1982). If ξ is known to the supplier, the optimal quantity is $Q^*(\xi) = \xi + \left(\frac{w-c}{w}\right)(\bar{\varepsilon} - \underline{\varepsilon}) + \underline{\varepsilon}$ (Ozer et al. 2014). As a benchmark, in the centralized supply chain, the optimal production quantity is $Q^c(\xi) = \xi + \left(\frac{r-c}{r}\right)(\bar{\varepsilon} - \underline{\varepsilon}) + \underline{\varepsilon}$ and the resulting optimal expected profit is $\Pi(\xi, Q^c(\xi)) = r \mathbb{E}_\varepsilon(\xi + \varepsilon, Q^c(\xi)) - cQ^c(\xi)$.

In all treatments, $r=150$, $w=100$, $c=50$ to ensure that the cost of overstocking is equal to the cost of understocking, ξ and ε are uniformly distributed on $[100, 400]$ and $[-75, 75]$, respectively. The task is programmed in z-tree software (Fischbacher, 2007).

Results

Table 2 presents the summary statistics of the participants' decisions and the measures of supplier's and retailer's discretionary collaboration. I highlight three preliminary observations. First, retailers reduced the inflation of their forecast report with the increased buyer-supplier identification and suppliers also decided to reduce less of their production quantity according to their retailer's report with the increased buyer-supplier identification. Compared retailers' report inflation with suppliers' production quantity reduction, the evidence shows that with the increased buyer-supplier identification, suppliers are more willing to exhibit discretionary collaboration with their retailers, that is, suppliers significantly reduced less in their production quantity than retailers' report inflation (Wilcoxon signed rank tests, $p<0.01$). Second, the correlation between ξ and ξ and between Q and ξ are strong and significantly positive in all treatments (t-test, $p<0.01$). This result indicates that retailers conveyed useful information about their private forecasts to suppliers, and suppliers relied on the retailer's report to make production decisions with the higher level of buyer-supplier identification. Further, the correlation between ξ and ξ and between Q and ξ are stronger with the increased buyer-supplier identification except for the suppliers in enhanced 1 treatment. This result provides the evidence that buyer-supplier identification is the potential factor that can promote collaboration.

Table 2: Treatments Summary Statistics: Mean, (Standard Deviation)

Treatments	$(\xi-\xi)$	$\text{Cor}(\xi, \xi)$	$(Q-\xi)$	$\text{Cor}(Q, \xi)$
Control	64.59 (49.43)	0.85	56.56 (64.34)	0.76
Minimum	46.88 (34.53)	0.92	40.62 (45.83)	0.86
Enhanced 1	30.65 (32.63)	0.94	32.51 (70.44)	0.71
Enhanced 2	25.13 (27.13)	0.95	20.51 (41.95)	0.89
Advanced	12.62 (12.26)	0.99	7.31 (15.27)	0.98

Note. Label "Cor" means correlation. All correlations are significant with $p < 0.01$

Test for Collaboration for Suppliers and Retailers

We first discuss retailers' collaboration which is measured by $(\xi-\xi)$. Retailers have the least forecast inflation indicates that they exhibit collaborative behaviors most. Figure 1 visualizes the average forecast inflation (measuring retailer's discretionary collaboration). I assume that if retailers collaborate with their suppliers, they will not inflate their report for their self-interest. Since retailers do not involve any cost of over-production, they have the self-interest to inflate the report to guarantee that their suppliers produce enough products for them to purchase. Results suggest that subjects in the minimum group which are only implemented the joint company names and logos has significantly reduced the forecasting inflation than those in the control group ($p < 0.01$). This result shows that with minimum effort (put the two companies' names and logos together), it successfully creates buyer-supplier identification and promotes retailers to generate discretionary collaboration. Similarly, compared to minimum group, subjects in enhanced group 1 which subjects solved a painting task together with an online chatting systems significantly reduced their forecast inflation ($p < 0.01$). This result suggests that shared experience is a more efficient way to enhance buyer-supplier identification which makes retailers more willing to collaborate. Third, there is no significant difference between enhance group 1 and enhanced group 2 which subjects solved a painting task face-to-face. This indicates

that shared experience matters for retailers but it does not matter whether it is online or face-to-face. Subjects exhibit the similar collaborative behaviors. Lastly, compared to enhanced group 1 and enhanced group 2, subjects in advanced group which they collocated with each other when making decisions significantly reduce the forecast report inflation ($p < 0.01$). This result provides the evidence that physical presence is the most sophisticated way to advance buyer-supplier identification.

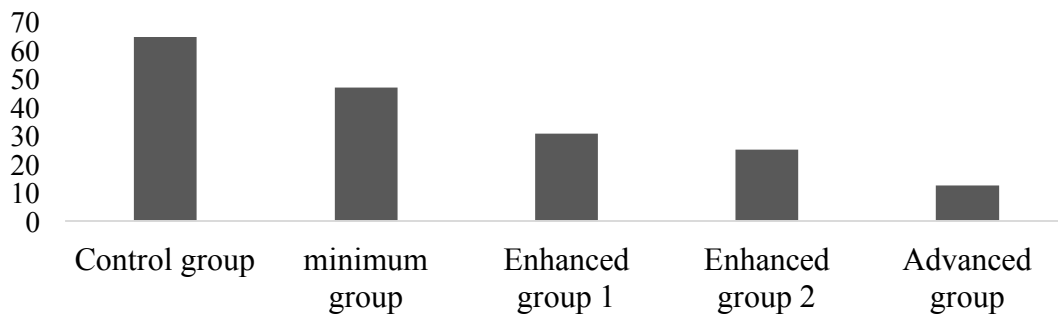


Figure 1: Retailer's report inflation

Second, suppliers' collaboration is measured by their production reduction (Q- ξ). Suppliers have the least production reduction indicates that they exhibit collaborative behaviors most. Figure 2 visualizes production adjustment differences (measuring supplier's discretionary collaboration). Since suppliers make the production plan according to retailers' forecast report, collaborative suppliers would produce the quantity based on retailers' report rather than reducing the production quantity to ensure the limited cost of over-production. Results indicate that subjects in the minimum group significantly reduced the production adjustment than those in the control group ($p < 0.01$), but no significant difference compared to enhanced group 1. However, if they solved the problem face-to-face with their retailers, they significantly reduced their production adjustment. This result suggests that it is easy to form buyer-supplier identification

for suppliers when they did a “team-building” task beforehand and they are more collaborative, but if they only solve the problem online with the retailers without physical presence, there is no significant difference in discretionary collaboration. Further, subjects did not significantly reduce their production adjustment compared enhanced group 1 with enhanced group 2 which indicates that if the suppliers can have some shared experience, either online problem solving or face-to-face problem solving does not make a difference. Finally, subjects in an advanced group significantly reduce production adjustment compared to enhanced group 2 ($p < 0.01$) which provide further evidence that physical presence is the most sophisticated way to enhance buyer-supplier identification for both suppliers and retailers.

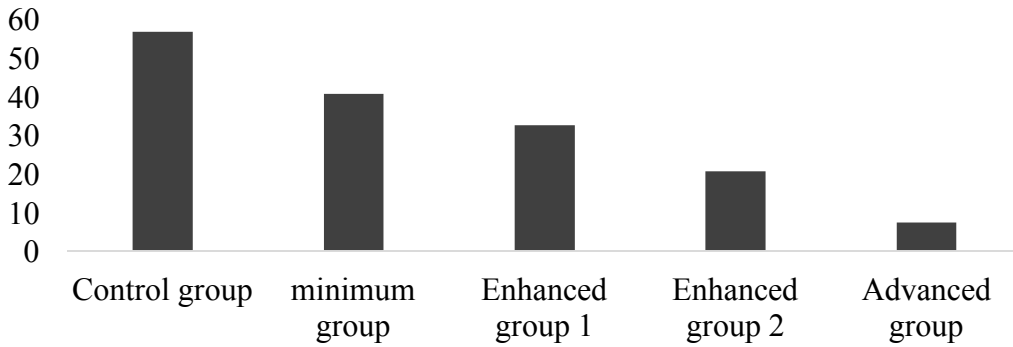


Figure 2: Supplier's production reduction

Test for Performance for Suppliers and Retailers

The above discussions demonstrate that buyer-supplier identification significantly impacts the levels of discretionary collaboration for both suppliers and retailers in a supply chain. The next step is to quantify these impacts on the resulting supply chain performance.

Supplier chain performance is calculated by the total of supplier's expected profit

$(\Pi^S(Q, \xi) = w \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q) - cQ)$ and retailer's expected profit $(\Pi^R(Q, \xi) = (r - w) \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q))$.

Results indicate that subjects in the advanced group have significantly better performance than

those in control group ($p < 0.01$), minimum group ($p < 0.01$), enhanced 1 group ($p < 0.05$), and enhanced 2 group ($p < 0.01$). This result provides the evidence that subjects perform much better when they collocate with their partners. However, there is no significant difference in performance among control group, minimum group, enhanced group 1, and enhanced group 2.

In terms of supply chain efficiency which is $E(\xi, Q) = [\Pi^S(Q, \xi) + \Pi^R(Q, \xi)] / \Pi(\xi, Q^c(\xi))$, results indicate that collocated supply chain (Advanced group) has significantly higher efficiency compared to enhanced group 1 ($p < 0.05$) and enhanced group 2 ($p < 0.1$). Table 3 presents the results derived from random effect.

Table 3: Treatment Comparisons

Comparison		Retailer forecast inflation	Supplier production reduction	SC performance	Efficiency
Control	Minimum	-17.51 (6.81)**	-15.95 (8.58)**	337.39 (462.91)	-0.02 (0.05)
	Enhanced 1	-16.95 (3.26)**	-12.03 (5.94)*	83.22 (351.77)	-0.01 (0.02)
	Enhanced 2	-13.08 (2.25)**	-12.02 (2.96)**	155.05 (162.97)	-0.002 (0.01)
	Advanced	-12.97 (1.50)**	-12.31 (1.92)**	324.10 (106.97)**	0.01 (0.006)
Minimum	Enhanced 1	-16.24 (4.64)**	-8.11 (9.85)	-200.98 (597.07)	-0.003 (0.05)
	Enhanced 2	-10.84 (2.27)**	-10.05 (2.78)**	64.15 (152.91)	-0.006 (0.03)
	Advanced	-11.43 (1.25)**	-11.10 (1.35)**	315.48 (80.32)**	0.02 (0.01)
Enhanced 1	Enhanced 2	-5.57 (4.23)	-12.00 (10.26)	355.84 (624.72)	-0.02 (0.04)
	Advanced	-8.97 (1.72)**	-12.60 (4.56)**	564.39 (285.53)*	0.03 (0.01)**
Enhanced 2	Advanced	-12.48 (3.01)**	-13.20 (3.86)**	805.45 (244.05)**	0.05 (0.03) ⁺

Note. p-values are derived from random effects.

⁺p<0.1, *p<0.05; **p<0.01.

Discussions and Conclusions

This paper investigates the effect of buyer-supplier identification on supply chain discretionary collaboration and performance in the context of forecast information sharing. It also explores the formation and foundation of buyer-supplier identification. In particular, this study focuses on a two-tier supply chain in which the upstream supplier solicits demand forecast information from the downstream retailer to make production decisions, and the retailer has an incentive to inflate her private forecast. Two key findings show that buyer-supplier identification is one of the crucial factors that can improve both supplier's and retailer's discretionary collaborative behaviors. Specifically, suppliers are more sensitive to the identification, and they are more willing to collaborate with their retailers if they form the buyer-supplier identification with their retailers. This result indicates that suppliers are more vulnerable in the supply chain since he/she has to depend on his/her retailer's forecast report to make the production plan. Buyer-supplier identification can promote discretionary collaborative behaviors which makes retailers consider their partner's welfare and the supply chain profit more than their own profits. Therefore, suppliers are more likely to collaborate. Second, collocation matters! For example, most of the major retailers such as Walmart, Costco, or Kroger highly recommend their suppliers have a dedicated team that collocates with them and only works on the relationship with them. There are some operational benefits of collocation such as more information sharing, faster decision-making process, or faster problem identifying and solving. However, this research shows that there are also some behavioral benefits generating from collocation. Collocation can create the strongest buyer-supplier identification which makes suppliers and retailers perceive shared goals and interests; they are more willing to consider the supply chain profit rather than only focus on their own profits and decisions that are all made from expected-profit-maximizing

solutions. They are more likely to collaborate with their partners to achieve the supply chain efficiency. It concludes that buyer-supplier identification which is created by collocation may be an efficient non-economics factor that can promote discretionary collaboration in buyer-supply relationships.

This research contributes to supply chain management literature in the following ways. First, the supply chain literature typically assumes that individuals are rational and decision making is based on expected profit maximization. A recent stream of research on behavioral operations management has demonstrated that this is not always the case and there are many factors that lead individuals to make decisions that deviate from self-profit-maximization solutions. For example, Loch and Wu (2008) find that relationship and status are aspects of social preferences that can influence individuals' behaviors as much as economic incentives. This research proposes buyer-supplier identification is another aspect of social preferences that acts as an alternative of economic incentives to promote voluntary behaviors. It enables firms to be more willing to collaborate and sacrifice their own profits to benefit both their peers and the supply chain.

Second, the majority of the identity research focus on organizational identity in management literature or group identity in the experimental economics literature. The similarity of the two streams of research is that they emphasize that the individuals identify with either their organization or their groups members (Dukerich et al., 2002; Mael and Ashforth, 1992; Ashforth and Mael, 1996; Chen and Li, 2009; Chen and Chen, 2011). To our knowledge, there is only two research in operations management literature that explore the role of identity. Papier et al. (working paper) focus on the group identity between demand planner and production planner who identified with the group in the intra-organizational level. Corsten et al. (2012) develop a

new concept—the supplier-to-buyer identification in the inter-organizational level, but it only targeted in the supplier side and the supplier identified with the retailer. This research explores identity that employees who work for a company that identified with their partner’s company. It is the relationship that outside of their own company. It emphasizes that an employee from a supplier firm/a buyer firm identified himself/herself to the buyer/supplier firm rather than his/her own firm. The supply chain relationship becomes an entity that creates buyer-supplier identification.

Third, this research is the first to employ a controlled laboratory experiment to explore the formation and foundation of buyer-supplier identification. We stick with the experimental economics literature and psychology literature that minimum group paradigm and shared experience can form the identity. However, we also mimic the real-world phenomenon—collocation—to test whether collocation can further enhance identification between supplier and retailers. This helps us to understand the behavioral benefits of collocation beyond the operational benefits.

Our findings offer several managerial implications for suppliers and retailers. First, buyer-supplier identification leads to systematic and beneficial patterns of behaviors, managers especially managers working for suppliers’ firms should think strategically about forming identification with their buyer firms. Previous literature has shown that power imbalance is always existing in the buyer-supplier relationship and the weaker party has perceived higher uncertainty which can reduce trust, commitment, and willingness to innovate (Ma et al., wp). By forming stronger buyer-supplier identification, it may balance the negative effect of power imbalance and improve the quality of the relationship.

Second, previous literature has shown that monetary incentives and contracts can regulate firms' behaviors. However, it has negative consequences such as crowding out intrinsic motivation (Frey and Jegen, 2001), deception (Gneezy, 2005), and dishonesty (Mazar et al., 2008). It is also costly to have a complete contract. Buyer-supplier identification can promote voluntary behaviors and act as an aspect of social preferences that may be more efficient and effective than monetary incentives and the formal contract.

Third, collocation is one of the most efficient ways to enhance buyer-supplier identification. It encourages retailers and suppliers work closely with each other. If suppliers are willing to establish a high-quality relationship with their major retailers, collocation is one of choices.

However, this research also has some limitations. First, this research only examined induced buyer-supplier identification and did not take the culture differences into consideration. People are from different backgrounds and behave differently in various culture backgrounds. For example, Westerners are more individualism and Easterners are more inclined to be collective. Further research may disentangle the effect of culture differences from induced buyer-supplier identification. Second, this research only considers the two-tier supply chain with one supplier and one retailer in the relationship. It would also be interesting to explore multi-supplier that compete for retailer's business and how the identification will form in this case.

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III. ESSAY 2

Who Is My Teammate? The Impact of Gender Composition on Supply Chain Collaboration and
Performance

Introduction

“This is a topic very close to my heart. As a female in two very male dominated industries – supply chain/logistics AND recruitment, I feel very passionately about flying the flag for women in my profession.”

-----JPS Supply Chain

As the world becomes increasingly integrated, and the workforce becomes more diverse, motivating more females to enter male-dominant careers and making them work efficiently with males are major challenges facing supply chain firms today. Women own their innate characteristics: intuition, flexibility, empathy, leadership, and multi-tasking abilities (Blasgen, 2011). One benefit of diversity is that people with different backgrounds may have different viewpoints (Adams and Funk, 2012) which may add value and creativity to the team. Previous literature has shown that diverse groups perform better at problem-solving related tasks than homogenous groups because both males and females can use their advantages to contribute to the team (Hong and Page, 2001). However, problems occur in the single-gender team especially male-dominated teams. For example, Kristof (2009) provides evidence that single-gender especially male-dominant top management team of financial firms is one of the important factors that contributes to the poor financial performance of banks. Therefore, this research is trying to understand how to motivate team work effectively and efficiently together. Particularly, it is investigating the impact of gender composition on trust, trustworthiness, and collaboration in buyer-supplier relationships.

Previous literature has shown that males and females behave differently and these differences would impact the economic outcomes. Men and women make different decisions in terms of risk preference, social preference, reciprocal behaviors, and competition (Apesteguia et al., 2012). Women are documented to be more risk averse because they may have strong

emotions toward risky choice and they may treat risk as a threat, while men may treat risk as a challenge and may be overconfident about their success (Croson and Gneezy, 2009). However, these differences on risk preference did not observe in the top management team. A woman executive does not lead to the more risk-averse decision (Adams and Funk, 2012) and a female can be risk-seeking if she works in the top management team. Further, women, in general, are more inequality averse (Andreoni and Vesterlund, 2001), but they show less trust compared to men (Eckel and Wilson, 2004). A vast of literature shows that women behave the same as men in terms of reciprocity (Eckel and Wilson, 2004), but the findings are inconsistent that women are less reciprocal than men. Also, regarding cooperation, women are found to be more cooperative than men, especially in the prisoner's dilemma game. Croson and Gneezy (2009) argue that females may be more sensitive to the context and social cues and they may adjust their behaviors according to the current context or match the social cues rather than making rational decisions, while men are more rational and less likely to make context-specific decisions and respond to social cues (Gilligan, 1982). Lastly, studies have differentiated competitive behaviors between men and women. They find that women are less likely to enter into a competitive environment, and they prefer teamwork rather than competition with their teammates (Eckel and Fullbrunn, 2015).

While a vast of research focuses on gender differences, these studies are done at the individual level which spotlight on the individual behaviors and performance, despite people are working together to make the team work effectively and efficiently. In the most recent literature, researchers have paid more attention to gender composition at the team level. Apesteguia et al. (2012) implement a L'Oreal e-Start challenge game to examine how gender composition (3-individual team) affects team performance. They find that compared to the other gender

compositions, if a team has three female members, they are less aggressive in their pricing strategies and invest less in research and development, but invest more in social sustainability initiatives. These less aggressive decisions make them outperform among all gender compositions. However, these studies are done at the team level within an organization. Considering a buyer-supplier relationship that a retailer works with a supplier, the retailer's job is to forecast for the final customer demand since he/she is closer to the final customer and the supplier's job is to produce products to make sure he/she produces enough for his/her retailer to sell. This relationship can be considered as a team, but not within an organization. It is the inter-organizational relationship. However, There lack studies that investigate how the gender composition in buyer-supplier relationships between organizations impact the quality of supply chain relationship and supply chain performance.

According to social identity theory, individuals generate in-group favoritism and out-group discrimination to enhance and maintain positive self-esteem (Tajfel and Turner, 1979). As a consequence, they perceive that their in-group members own similar traits as them compared to out-group members (Allen and Wilder, 1975). Due to the similarity, individuals are more likely to assign the positive traits to their in-group members and negative traits to out-group members (Brewer, 1979). Therefore, they are more likely to help their in-group members than the out-group members (Crosby et al., 1980), allocate more resources to in-group members than out-group members (Wilder, 1986), and to show more charity, less envy, more reciprocity, to in-group members than out-group members (Chen and Li, 2009).

There are different ways to recognize identity. In the real world, individuals can have multiple identities simultaneously (Hewstone 1996). Considering an Asian American female, she is a mom of two kids and working as an engineer. She may have multiple identities at the same

time—she identified with other females, she identified herself into an Asian group, she identified herself into mom’s club, and she identified herself with her working organization. Some of the identities are induced such as the mom’s club, or the identity of the organization, but some of the identities are natural such as gender or ethnicity. Previous literature has shown that gender identity can alter individual’s behaviors (Dittmar et al., 1995; Ely, 1995; Egan and Perry, 2001), and can create common goals and values (Chen et al., 2014). Therefore, understanding the impact of gender composition can help firm shape their teams to make their team members work more effectively and efficiently.

This study provides several contributions. First, different from most studies that are examining induced group identity in the laboratory, this study focuses on the individuals’ existing natural identity—gender identity. Thus, compared to the induced group identity, results provided in this study can be easily applied to the real-life environments. Second, this study extends the previous literature to the effect of gender composition on buyer-supplier collaboration and performance. Most of the previous studies are only focusing on individual level gender differences, but this study is conducted at the team level that examining the salient of gender identity of their partners. It also explores the differences between females and males in trust and trustworthiness in buyer-supplier relationships. Third, this study is the first in operations management literature to use gender identity as a non-economic tool to promote trust, trustworthiness, collaboration, and supply chain performance.

The rest of the paper is structured as follows. It provides a literature review on gender differences in the next section, following with hypotheses development. After the hypotheses, this paper presents the details of the controlled laboratory experiment and results. In the last section, it discusses the conclusions and implications of this research.

Literature Review

Gender is widely recognized to be an important empirical factor in understanding many aspects of behaviors (Steward and McDermott, 2004). The usefulness of social identity theory for this study lies in the theory's attempts to capture how individuals' identity in a group shapes their perspectives and experiences. Ashforth and Mael (1989) mention that identity has two components: a personal and a social component. The personal component is derived from individual's characteristics, such as personality and physical and intellectual traits; and a social component is derived from salient group memberships, such as sex, race, class, and nationality (Ashforth and Mael, 1989). Gender identity is included in the individual's social identity; it means that women may generate the group membership with the female group and they compare their female group with the male group. Identification with his/her own category can be associated with positive, negative, or ambivalent feelings, depending on the salience and nature of comparative distinctions between men and women in a given setting. Once people generate their salient identity, they have a clear view and expectation that how they and other people who also belong to this category should behave. Previous literature in psychology, sociology, and experimental economics has explored the gender differences in risk preference, social preference, reciprocal behavior, and competition.

Many of the decisions are made under risk. However, previous literature has shown that females behave differently from males when they make risky decisions. It is because women are more risk-averse and men are more risk-seeking in the vast majority of environments and tasks (Croson and Gneezy, 2009). Byrnes et al. (1999) conduct a meta-analysis of 150 studies in which the risk-taking tendencies of male and female participants are compared. They find that females behave/perceive differently than males in certain topics such as intellectual risk taking and

physical skills. These differences are particularly pronounced when it comes to physical or life-threatening risks (Hersch, 1997). In addition, gender differences in risk propensity have been observed in another context such as financial decision-making or investment decisions. Powell and Ansic (1997) examine whether gender differences in risk propensity and strategy in financial decision-making can be viewed as general traits. They find that females are less risk seeking than males irrespective of familiarity and framing, costs, or ambiguity. Results also indicate that males and females adopt different strategies in financial decision environments, but these strategies have no significant impacts on the ability to perform. Zinkhan and Karande (1991) provide evidence that when it comes to the investment decisions in which the situation is ambiguous and uncertain, females tend to be more conservative than males.

Experimental economics has also explored the gender differences in risk preference. Charness and Gneezy (2011) assemble 15 sets of experiments with one simple underlying investment game. They find that women tend to invest less and they appear to be more financially risk-averse than men. Felton et al. (2002) conduct a semester-long experiment to examine the role of gender on the riskiness of investment choices of students. Results indicate that males are making more risky investment choices than females due to males' overconfidence. Borghans et al. (2009) also document that women are more risk-averse than men. They provide insights into the relationship between psychological traits and economic preference parameters. Results indicate that personality traits such as agreeableness or neuroticism might be an explanation of gender differences. Croson and Gneezy (2008) provide several explanations for the effect of gender differences on risk preference. Emotion might play a role in the gender difference on risky choices (Croson and Gneezy, 2008). According to Loewenstein et al. (2001), females experience emotions more intensely than male on average. For example, when men and

women are asked to recall their saddest memory, positron emission tomography scans indicate that brain activity increases significantly more in the female brain than in the male brain (Andersson, 2001). Therefore, due to the intensive level of nervousness and fear experienced by females (Brody, 1993), they are more emotional intolerable than males for loss when they make risky choices. In addition, emotions may also affect the evaluation of outcomes as well as evaluation of probabilities (Croson and Greezy, 2008) which hinder females to make risky decisions. Croson and Greezy (2008) also document that overconfidence (males tend to be overconfident in their success in uncertain situations than women) and different interpretations of risk (males view risk as challenge and females perceive risk as a threat) are other reasons that may explain the gender difference in risk preference.

Previous literature has also documented gender differences in social preference. Social preference includes fairness perceptions such as inequity aversion, trust, altruism, and reciprocity in the experimental economics literature (Levitt and List, 2007). Solnick and Schweitzer (1999) explore gender differences on perceived fairness in the ultimatum game setting. They report that men are treated differently from women. Individuals are more generous toward men than toward women. Solinick (2001) did a follow-up study to examine the behaviors of men and women in the ultimatum game. This study has provided evidence that gender composition can alter individual's behaviors. First, results indicate that men and women offer the similar amount to their partners without knowing their parnter's gender, but in terms of the receivers, men received more than women. Further, people expect that women should be satisfied with a smaller share or should accept less, but in his experimental setting, females choose higher minimum acceptable amounts compared to men. Due to the same reason, both men and women offer less to women. In addition, people expect that women should share more and keep less. Therefore, if individuals,

no matter men or women, pair with a woman, they set their minimum acceptable amount higher compared to those who are paired with a man. Further, Guth et al. (2007) employ a three-person bargaining experiment and consistent with previous results, women are more inequity averse which means they care more about equal distributions. Similarly, Eckel and Grossman (1997) use a “punishment game” where subjects can choose to split a larger pie with a “bad” partner, or a smaller pie with a “good” partner to explore the gender differences in the impact of fairness on the outcome. Results suggest that men are less likely to punish unfair behaviors compared to women. This result is consistent with previous literature. For males, fairness is more of an absolute statement and a matter of principle—one is either fair or unfair. Fairness for a male is independent of other factors such as price. That might be because men are more rational and only do what is “right” regardless of the price. However, females are irrational, and they put greater consideration of the circumstances surrounding the decision.

Males are not only different from females in perceived fairness, but also in trust and trustworthiness (reciprocity). With respect to the literature on trusting, both survey results and experimental findings show that, in general, men trust more than women. Alesina and La Ferrara (2002) suggest that women are less likely to believe that most people can be trusted according to the information provided by the General Social Survey (GSS). By using the same survey source, Irwin et al. (2015) report consistent results that females exhibit less trust compared to males. Croson and Buchan (1999) use a trust game in the laboratory to explore the gender difference in trust and trustworthiness. They find that males and females offer the similar amount to their partners, but females return significantly more than males. This result indicated that females and males exhibit the same level of trust, but women show significantly more reciprocity (trustworthiness) in this game. Buchan et al. (2008) conduct an investment game and find that

men trust more than women, and women are more trustworthy than men. In addition, results suggest that men are just as trusting and trustworthy toward women as toward other men, and women are just as trusting and trustworthy toward men as toward other women.

To answer the question why males are different from females in term of trust, the most two popular explanations are altruism and reciprocity. Croson and Buchan (1999) argue that women are more altruistic than men. For example, women care more about their partner's consumption than men do. This can explain why females return more to their partners than men which are the measure of trust in the trust, ultimate, or investment game. Similar findings are provided in the experimental economics literature. For example, Nowell and Tinkler (1994) find that females are more altruism and collaborative compared to males. Similarly, Andreoni and Vesterlund (2001) report that when altruism is expensive, women are kinder, but when it is cheap, men are more altruistic. This result indicates that men are more responsive to price change and they are more likely to behave in extremes—either perfectly selfish or perfectly selfless. Irwin et al. (2015) provide evidence that females trust less than males. This result is consistent with Eckel and Grossman (1998)'s findings. The results indicate that women are more generous and show much higher levels of reciprocity than males when the situation is certain.

Moreover, a series of psychology studies and experimental economic studies suggest that men are more competitive than women. For example, boys prefer spending most of their time at competitive games such as fighting games, but girls are more likely to select activities where there is no winner and no clear end point such as dress up games or cooking games (Niederle and Vesterlund, 2007). Previous literature has shown that women are less competitive than men. This result indicates that fewer women are willing to involve in a tournament, and it also provided the

evidence that it is less likely for a female to win the tournament. Therefore, there is a vast of literature that explores gender difference in reacting to competition and how to promote women to compete. Gneezy et al. (2003) ask both males and females to solve mazes on a computer for fifteen minutes. Their payment either based on a piece-rate or enrolled in a tournament. Results indicate that when subjects are paid based on a piece-rate, males perform slightly better than females, but not significantly better. However, when subjects are enrolled in a tournament, males perform significantly better than females. This result provides the evidence that males are more competitive than females. Similarly, when subjects are asked to choose their own incentive scheme when they solve a problem, males prefer selecting tournament to receive their compensation, but females are more likely to choose a piece-rate for their payment (Niederle and Vesterlund 2007). The result shows that women are shy away from competition and men embrace it. Gneezy et al. (2009) conduct a field experiment in Maasai, Tanzania, and Khasi, India. Maasai represents a patriarchal society, whereas the Khasi are matrilineal. They find that Maasai men opt to compete for approximately twice the rate as Maasai women. However, Khasi women compete more than Khasi men. Further, Gneezy et al. (2003) find that males perform significantly more efficient than females in a competitive environment and a significant increase in performance, but not for women.

Therefore, some scholars are interested in how to promote females to compete. Healy and Pate (2011) suggest that teams can reduce the gender competition gap. If subjects are asked to choose whether to compete based on the combined performance of themselves and a teammate, a two-person team could significantly reduce the gender competition gap. Females prefer competing in teams, but males prefer competing in individuals. Moreover, Niederle et al. (2013) explore whether the affirmative action is a compensation strategy to encourage more women to

enter to a tournament. They find that guaranteeing women the equal representation among winners increases their entry to compete. This result suggests that if it is guaranteed that a certain amount of women would win, it encourages women to compete against the other women rather than men.

Since previous literature shows that males are more competitive than females, does that indicate that women are more collaborative? In an early study, Rapoport and Chammah (1965) find that men cooperate significantly more than women. However, the findings are inconsistent. Ortmann and Tichy (1999) report that women cooperate significantly more than males in the first round, but this collaborative behavior vanishes by the last round. In the meantime, some studies show that there are no gender differences on cooperation (Orbell et al., 1994). However, previous literature has pointed out that gender composition plays a significant role in changing individuals' collaborative behaviors. For example, Charness and Rustichini (2011) implement a prisoner's dilemma game with the presence of the third person. They find that males cooperate substantially less often when observed by their peer group, while females cooperate substantially more often. Similarly, Ortmann and Tichy (1999) indicate that females are significantly more cooperative in the mixed groups than in all-female groups.

Lastly, females are different from males in negotiation. Stuhlmacher and Walters (1999) suggest that men negotiate significantly better outcomes than women. Sutter et al. (2009) report that gender itself has no significant effect on bargaining, but gender composition does. If subjects are in the same gender, the negotiation process is more competitive and less efficient. Moreover, Stevens et al. (1993) indicate that women negotiate lower salaries than men even though they receive the same training as males.

Research Hypotheses

The Impact of Gender Composition on Collaboration

Supply chain collaboration is defined as two or more autonomous firms working jointly to plan and execute supply chain operations (Simatupang and Sridharan, 2002). Previous literature has shown that females are different from males in terms of risk preference, social preference, competition, and negotiation. On the one hand, women are kinder (Robichaud et al., 2003), more agreeable (Feingold, 1994), and more supportive of their friends (Oswald et al., 2004). On the other hand, males provide more help to strangers in need (Eagly and Crowley, 1986), and have a stronger preference for coordinated social play as children (Ostrov et al., 2004). Due to the different characteristics of males and females, it is interesting that how females and males behave differently when matched with the same gender or opposite gender as a team.

According to social identity theory, the similarity between individuals in the team can influence their behaviors. Turner et al. (1987) argue that the basis of objective attributes such as race, age, and gender can create salient group memberships for individuals themselves and people in the same group. Gender is sufficient enough to trigger in-group favoritism and out-group discrimination (Tajfel and Turner, 1979). It may further create and maintain collaborative working relationships (McAllister, 1995). Individuals are more likely to perceive out-group members as dishonest, untrustworthy, and uncooperative compared to their in-group members (Brewer, 1979). In addition, Charness et al. (2007) investigate the effect of group membership on individual behaviors. They find that salient group membership influences behaviors that if people are observed by other members of the same group, they tend to make more aggressive decisions. Sutter (2009) extends their results and find that with salient group membership, a individual decision can be treated as a team decision when it is a non-strategic decision. Chen

and Li (2009) test in-group and out-group allocations and responses and find that individuals are more likely to be pro-social and have positive perceptions when match with another in-group member. Since gender is treated as the natural identity of a person, when individuals work with a person with the same gender, they may exhibit in-group favoritism and more likely to collaborate when they face social dilemmas. Social dilemma in this paper is defined as “situations in which individuals must decide whether they will cooperate with others within a group, thus benefiting the group as a whole, or defect from the group, thus maximizing their own personal gains” (Dawes, 1980, p. 43). Therefore, individuals in the same-gender team in a buyer-supplier relationship are more likely to collaborate than the different-gender team.

H1a: Compared to individuals in the opposite-gender team, those in the same-gender team from a buyer-supplier relationship are more likely to exhibit collaborative behaviors.

Further, it is not clear that whether both-male team is more likely to collaborate than both-female team, or vice versa. According to Gilligan (1982)’s argument, females and males approach moral problems in distinct ways that females are more inclined to emphasize the relationship and care, while males are more inclined to emphasize work, competition, and assertive. These varying gender role behaviors encourage women to define themselves more frequently than men in terms of relationships to other people, particularly close associates, and the related ability to maintain interpersonal harmony and social intimacy (Kellert and Berry, 1987). In addition, as Maccoby (1992) suggests, girls’ same-gender interactions tend to be more cooperative and pro-social, whereas boys’ same-gender interactions tend to place greater emphasis on the social dominance. Human evolutionary history indicates that males compete with other males for food, territory, and access to females (Darwin 1871). Charness and

Rustichini (2011) experimentally examine how males and females differ in social behaviors when same-gender peers observing their action. They find that males cooperate substantially less frequent when observed by their male peers in contrast that females cooperate substantially more often when observed by their female peers. Therefore, we are expecting that both-female team is more likely to collaborate in a buyer-supplier relationship compared to both-male team.

H1b: Compared to individuals in the both-male team, those in the both-female team from a buyer-supplier relationship are more likely to exhibit collaborative behaviors.

The Effect of Gender Composition on Trust and Trustworthiness

Trust is defined as the willingness to be vulnerable to the actions of a trustee and the trustor expects that the trustee will perform a particular action without any monitoring or control mechanisms (Schoorman et al., 2007). It is the individuals' willingness to be vulnerable to their partners and they give their partners the power to have significant influence over their working lives (Mayer and Davis, 1999; Mayer and Gavin, 2005; Schoorman et al., 2007). Further, Mayer et al. (1995) introduce trustworthiness into the literature which is attributes or characteristics of a trustee that inspire trust. Trustworthiness includes three dimensions—ability, integrity, and benevolence. Ability focuses on competence, skills, efficiency, and dedication (Colquitt and Rodell, 2011) that whether the partners are qualified for the work or not; integrity reflects whether the partners can adhere to a set of acceptance principles or a set of shared values; and benevolence is the sense that whether the individual cares about his/her partner such as the profit (Colquitt and Rodell, 2011).

Trust has been studied extensively in the literature, but trustworthiness especially the ability dimension has not received scholars' full attention in a relational setting. However,

trustworthiness in ability is a crucial point to build the relationship because most of us need the service of an expert to make decisions or solve problems in some circumstance (Dulleck and Kerschbamer, 2006). For example, if you decide to purchase a used car from a person, you may want to ask a mechanic—the third party to check whether the car is reliable and in a good working condition. Two aspects of trust involved in this situation. The car does not have any problems according to the mechanic's report, and you fully trust his report, and you fully trust the mechanic is well-qualified to do a full-inspection for all the potential problems. The former trust is you believe his integrity, and the latter is you trust his ability. In the buyer-supplier relationship, sometimes, suppliers/retailers are willing to trust each other's integrity, but they do not trust their partners' ability. Suppliers/retailers are not willing to work together not because they do not trust their partners' integrity, but because do not think their partners have the ability to do a good job.

Previous literature has shown the gender differences in trust, but results are mixed. A bunch of studies find that there are no gender differences in trust. Croson and Buchan (1999) investigate in an interesting inter-cultural setup to explore gender differences in trust and trustworthiness (reciprocity). They find that no matter what nationality the trustor is, there is no significant difference between males and females. This result is also confirmed by Clark and Sefton (2001), Cox and Deck (2006), and Bohnet (2007). However, some studies report that males trust more than females. For example, Migheli (2007) conduct a trust game with a broad European sample size to explore whether social capital is an aspect that can explain trusting behaviors between females and males. He finds that after controlling social capital, males still trust more than females. Chaudhui and Gangadharan (2007), Buchan et al. (2008), and Garbarino and Slonim (2009) report the similar results that males trust more than females. In addition, there

are few studies that report females trust more than males. Bellemare and Kroger (2007) explore the gender difference in the investment decisions, finding that females trust more than males when making the investment decisions.

Croson and Gneezy (2008) provide several explanations for these inconsistent findings such that women are more sensitive to cues in the experimental context than men. Gilligan (1982) has the similar conclusion that men are more likely to be impacted by the context. However, all these studies only investigate trust in general and did not specify whether individuals trust their partners' collaboration or whether their partners have the ability to perform the job.

The reason we examine trustworthiness is due to the stereotype of females. Several studies have shown that when making individuals' gender identity salient especially when making female's gender identity salient, individuals will perform differently with the same ability level. Females are more likely to suffer from stereotype threat, which is a "situational phenomenon that occurs when targets of stereotypes alleging intellectual inferiority are reminded of the possibility of confirming these stereotypes" (Inzlicht and Ben-Zeev, 2000, p. 365). Nosek et al. (2002) find that females are stereotyped to be negatively toward math and science in contrast to males who are stereotyped as good at math and science when making their gender identity salient. Considering a male production manager from a supplier's company that decides production plans and a female purchasing manager from a retailer's company that forecasts the final customer demand, the male production manager may not fully trust the female purchasing manager's ability to do a good job due to the stereotype of females that they are poor on math and science. To our knowledge, there is only one study that explores gender composition on trust in collaboration or ability. Schwierien and Sutter (2008) find that there is no significant difference

between males and females on trust in collaboration, but men trust more in the (mathematical) abilities of their interaction partners than women. What we are interested in is when making gender identity salient, whether males trust less in the ability of their interaction partners if they work with a female. Further, whether females trust more in the ability of their interaction partners if they work with a male due to the stereotype of female and male.

H2a: Compared to the opposite-gender team, Individuals in the same-gender team have a higher level of trust and trustworthiness.

H2b: Compared to the female-female team, males in the male-male team have a higher level of trust and trustworthiness.

H2c: Compared to female retailers in the opposite-gender team, male retailers in the opposite-gender team have a higher level of trust and trustworthiness.

The Impact of Gender Composition on Buyer-supplier Performance

Compared to the literature on gender and tournaments, the literature on gender and teams are remarkably sparse. Dufwenberg and Muren (2006) investigate the influence of gender composition on group decisions. In a dictator game setting, they find that groups are more generous and equalitarian when women are the majority. They also find that if the group has two men and a woman, it is considered to be the most generous group. In the field, Bagues and Esteve-Volart (2010) provide the evidence that the chances of individual's success as the Corp of the Spanish Judiciary are affected by the gender composition of their evaluation committees. They find that female candidates have better chances of success with more males on the committees. This result provides the evidence that females play a significant role in determining firm/team performance. Adams and Funk (2012) investigate the role of the female in the top

management team, suggesting that females are less tradition and security oriented than their male counterparts. They are more risk seeking than males and having a woman on the board did not lead to more risk-averse decisions. Apesteguia et al. (2012) explore how the gender composition of teams affect their economic performance. They find that teams formed by three women are significantly outperformed by all other gender combinations due to less aggressive decisions such as pricing and investment. This result is consistent with Adams and Funk (2012) that females can make risky decisions in some circumstance. Therefore, we hypothesize that both-female team will outperform compared to other teams.

H3a: Both-female team will achieve better buyer-supplier performance than any other gender combination.

Methodology

Experimental Design

The experimental design addresses the following objectives: to determine the effects of gender composition on trust, trustworthiness, collaboration, and supply chain performance in buyer-supplier relationships. This study employed a 2 by 2 between-subject design, in which we manipulated gender composition in a buyer-supplier relationship (supplier's gender—male versus female and retailer's gender—male versus female). We abbreviate the treatments by FF, FM, MF, and MM, where F (M) stands for female (male) and the first letter indicates the gender of the supplier. Consistent with Schwierien and Sutter (2008), participants were informed about the gender of his/her partner by stating the first name. To avoid the confusion of International names, if the partner is a female, the first name is presented as Sarah. On the other hand, if the partner is a male, the first name is presented as Mike. In the meantime, to make subjects aware of

their own gender, we asked about their demographic information (e.g. gender, age, and education) at the beginning of the experiment.

Participants

A total of 214 participants (112 females and 102 males) was recruited from a large southern university, mostly undergraduates, from various fields of study who volunteered through an online recruitment system from a database of 3500 students at a medium-sized university in the US. The task was incentivized with cash based on subjects' performance. Participants were paid their actual earnings after all subjects finished the post-experiment questionnaire, privately and in cash. They received an initial endowment of \$5.00 for showing up at the lab. In addition, the average payment for the approximately 45-minute task was \$10.21. The summary of the treatments is shown in Table 1.

Table 1: Summary of the treatments

Retailer		Supplier	
		Female	Male
	Female	FF (n=60)	MF (n=52)
	Male	FM (n=52)	MM (n=50)

Note. Half of the subjects play the role of supplier and the other half play the role of retailer.

Experimental Procedure and Software

Experimental procedure

All 14 experimental sessions followed the similar protocol. Participants arrived at the computer lab at the designated time and were randomly and anonymously assigned to the role of either the supplier or the retailer at the beginning of the experiment. Subjects read the paper-based instruction including two parts—general instruction with basic lab rule and payment structure and the forecasting task instruction. After finish reading instructions, subjects watched a video which highlighted the important components of the forecasting and production task.

After the video instruction, subjects played a forecasting and production task for 23 periods which included 3 practice rounds. At the end of the experiment, all the subjects were asked to complete a post-experiment questionnaire with the manipulation checks and individual difference variables as control variables.

Tasks and software

Similar as Essay 1, I adapted the forecasting task from Ozer et al. (2014). There is a two-tier supply chain with a supplier and a retailer. The supplier produces the product and sell it to the supplier. The retailer purchases the product from the supplier and sells it to the final customer. Since the retailer is closer to the final customers, he/she has better demand forecast information than the supplier. To better plan the production, the supplier wants to solicit the demand information before the demand is realized.

In this Essay, the final customer demand is random and modeled as $D=\xi+\varepsilon$. The notion of ξ represents the retailer's private forecast information that is only available to the retailer and the supplier only knows that it is a random variable distributed on $[\underline{\xi}, \bar{\xi}]$. The notation of ε is the market uncertainty of the product. Both parties only know that it is a zero-mean random variable distributed on $[\underline{\varepsilon}, \bar{\varepsilon}]$. To ensure the demand is positive, we assume $\underline{\xi} + \underline{\varepsilon} > 0$.

In the experiment task, the retailer observes his /her private forecast information ξ and submits a report $\hat{\xi}$ to the supplier. In the next step, the supplier receives the report $\hat{\xi}$ and produces Q units of the product at the unit cost of c . After that, demand D is realized and the retailer purchases $\min(D, Q)$ from the supplier at a unit whole-sale price of w . In the last step, the retailer sells the product to the end customers at a unit retail price of r and both parties' profits are realized. We assume $r \geq w \geq c \geq 0$ to ensure the profitable production.

Given Q and ξ the supplier's and retailer's expected profits are

The supplier's expected profit: $\Pi^S(Q, \xi) = w \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q) - cQ$

The retailer's expected profit: $\Pi^R(Q, \xi) = (r - w) \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q)$

In all treatments, $r=150$, $w=100$, $c=50$ to ensure that the cost of overstocking is equal to the cost of understocking, ξ and ε are uniformly distributed on $[100, 400]$ and $[-75, 75]$, respectively. The task is programmed in z-tree software (Fischbacher, 2007).

Measurement

Trustworthiness. The trustworthiness facets were adapting from Mayer and Davis (1999) and Colquitt and Rodell (2011) to assess the ability, benevolence, and integrity of the partner (either the supplier or the retailer). We used a scale ranging from 1, “strongly disagree,” to 7, “strongly agree” to evaluate the extent to which the subjects agreed with the statements in each scale.

Trust. The 4-item measurement of trust was adapted from Colquitt and Rodell (2011). The extent of the agreement was assessed on 7-point Likert Scale from 1, “strongly disagree,” to 7, “strongly agree”. Table 2 presented the factor loadings of trustworthiness and trust.

Table 2: Factor loadings for trust and trustworthiness

Items	Factor Loadings and Cronbach's α
Trustworthiness (Ability)	0.901
Sarah (Mike) is very capable of performing her job.	0.803
Sarah (Mike) is known to be successful at the things she tries to do.	0.864
Sarah (Mike) has a lot of knowledge about work to be done.	0.829
I feel very confident about Sarah (Mike)'s skills.	0.876
Sarah (Mike) is well qualified.	0.861
Trustworthiness (Integrity)	0.870
Sarah (Mike) has a strong sense of justice.	0.829
I never have to wonder whether Sarah (Mike) will stick to her word.	0.859
Sarah (Mike) tries hard to be fair in dealing with me.	0.853
Sarah (Mike)'s actions and behaviors are not very consistent.	0.853
Trustworthiness (Benevolence)	0.860
Sarah (Mike) is very concerned about my welfare.	0.838
My needs and desires are very important to Sarah (Mike).	0.816
Sarah (Mike) would not knowingly do anything to hurt me.	0.855
Sarah (Mike) will go out of her way to help me.	0.853
Trust	0.880
I would be comfortable giving Sarah (Mike) a task or problem that is critical to me, even if I could not monitor her actions.	0.874
I would be willing to let Sarah (Mike) have complete control over our business in the relationship.	0.868
I really wish I had a good way to keep an eye on Sarah (Mike).	0.843
If I had my way, I wouldn't let Sarah (Mike) have any influence over business that are important to me.	0.846

Collaboration. Different from trustworthiness and trust which were the perceptual measures, the supplier's and retailer's collaboration is objectively assessed. First, the retailer's collaboration was measured by the forecast report inflation. If the retailer is collaborative, he/she is willing to report truthful information to his/her supplier to help them make the production plan. Second, the supplier's collaboration was measured by the production reduction. If the supplier is collaborative, he/she also concerns about his/her partner's profit. Therefore, he/she

will not reduce the production only to cut down the holding cost for himself/herself, but might lead to the unsatisfied demand.

Results

Test for Trustworthiness for Suppliers and Retailers

One-way ANOVA with gender composition (Female-Female vs. Male-Female vs. Female-Male vs. Male-Male) as the fixed factor and trustworthiness (ability) as the dependent variable was used. Results indicated that there was a significant effect of gender composition on trustworthiness (ability), $F(1,210)=131.22$, $p<.001$. To further interpret the results, the Bonferroni method was employed to compare each treatment. Results suggested that subjects in the Female-Female treatment ($M=6.14$) significantly trusted their partner's ability more than those in the Male-Male treatment ($M=5.66$, $p=0.04$); subjects in the Male-Male treatment ($M=5.66$) significantly trusted their partner's ability more than those in the Female-Male treatment ($M=4.45$, $p<.001$); subjects in the Female-Male treatment ($M=4.45$) significantly trusted their partner's ability more than those in the Male-Female treatment ($M=3.68$, $p<.001$).

One-way ANOVA with gender composition (Female-Female vs. Male-Female vs. Female-Male vs. Male-Male) as the fixed factor and trustworthiness (Integrity) as the dependent variable was used. Results indicated that there was a significant effect of gender composition on trustworthiness (Integrity), $F(1,210)=400.59$, $p<.001$. To further interpret the results, the Bonferroni method was employed to compare each treatment. Results suggested that subjects in the Female-Female treatment ($M=5.95$) trusted their partner's integrity in the similar level as those in the Male-Male treatment ($M=5.93$); subjects in the Female-Male treatment ($M=2.94$) trusted their partner's integrity in the similar level as those in the Male-Female treatment

($M=3.03$); However, subjects in the Male-Male treatment and Female-Female treatment significantly trusted their partner's integrity more than those in the Male-Female and Female-Male treatments ($p<.001$).

To test the impact of gender composition on trustworthiness (benevolence), one-way ANOVA with gender composition (Female-Female vs. Male-Female vs. Female-Male vs. Male-Male) as the fixed factor and trustworthiness (benevolence) as the dependent variable was used. Results provided the evidence that there was a significant effect of gender composition on trustworthiness (benevolence), $F(1,210)=427.74$, $p<.001$. To further interpret the results, the Bonferroni method was employed to compare each treatment. Results suggested that subjects in the Male-Male treatment ($M=6.01$) trusted their partner's benevolence in the similar level as those in the Female-Female treatment ($M=5.87$); subjects in the Female-Male treatment ($M=3.04$) trusted their partner's benevolence in the similar level as those in the Male-Female treatment ($M=2.96$); However, subjects in the Male-Male treatment and Female-Female treatment significantly trusted their partner's benevolence more than those in the Male-Female and Female-Male treatments ($p<.001$).

Test for Trust for Suppliers and Retailers

To test the effect of gender composition on trust, one-way ANOVA with gender composition (Female-Female vs. Male-Female vs. Female-Male vs. Male-Male) as the fixed factor and trust as the dependent variable was used. Results indicated that there was a significant effect of gender composition on trust, $F(1,210)=189.78$, $p<.001$. To further interpret the results, the Bonferroni method was employed to compare each treatment. Results suggested that subjects in the Male-Male treatment ($M=6.11$) significantly trusted their partner more than those in the Female-Female treatment ($M=5.09$, $p<.001$); subjects in the Female-Female treatment ($M=5.09$)

significantly trusted their partner more than those in the Female-Male treatment ($M=3.51$, $p<.001$); subjects in the Female-Male treatment ($M=3.51$) significantly trusted their partner more than those in the Male-Female treatment ($M=3.13$, $p=.05$).

Test for Collaboration for Suppliers and Retailers

Retailers' collaboration was measured by the forecast report inflation—the less the subjects inflated their report, the more they collaborated. Results from random effect indicated that retailers in Female-Female treatment had significantly less forecast inflation compared to those in the other three treatments, suggesting that female retailers were significantly more collaborative when their partners were females compared to the male retailers in the Male-Male treatment ($\chi^2=387.86$, $p<.001$), female retailers in the Male-Female treatment ($\chi^2=114.8$, $p<.001$), and male retailers in the Female-Male treatment ($\chi^2=263.15$, $p<.001$). Furthermore, male retailers were significantly more collaborative than female retailers in the Male-Female treatment ($\chi^2=262.68$, $p<.001$) and male retailers in the Female-Male treatment ($\chi^2=61.65$, $p<.001$). However, female retailers in the Male-Female treatment did not behave significantly different from the male retailers in terms of collaboration.

Table 3: Treatment Comparisons

Comparison		Retailer forecast inflation	Supplier production reduction	SC performance
Female-Female	Male-Male	9.68**	10.08**	-359.00**
	Male-Female	11.48**	14.28**	-955.50**
	Female-Male	6.61**	6.14**	-657.35**
Male-Male	Male-Female	8.72**	8.23**	-59.02
	Female-Male	14.71**	17.08**	232.79
Male-Female	Female-Male	2.47	1.05	-352.55

Note. p-values are derived from random effects.

⁺ $p<0.1$, * $p<0.05$; ** $p<0.01$.

Second, suppliers' collaboration was measured by their production reduction ($Q - \xi$). Results from random effect provided evidence that female suppliers in the Female-Female treatment had significantly less production reduction among all four treatments, suggesting that female suppliers were significantly more collaborative when their partners were females compared to male suppliers in the Male-Male treatment ($\chi^2=225.21$, $p<.001$), female suppliers in the Male-Female treatment ($\chi^2=539.68$, $p=.007$), and male suppliers in the Female-Male treatment ($\chi^2=192.14$, $p=.003$). Furthermore, male suppliers were significantly more collaborative than female suppliers in the Male-Female treatment ($\chi^2=522.37$, $p=.01$) and male suppliers in the Female-Male treatment ($\chi^2=290.52$, $p=.003$). However, female suppliers in the Male-Female treatment did not behave significantly different from the male suppliers in terms of collaboration.

Test for Supply Chain Performance

The above discussions demonstrate that gender composition significantly impacted the levels of trust, trustworthiness, and collaboration for both suppliers and retailers in a buyer-supplier relationship. The next step is to quantify these impacts on the resulting supply chain performance. Supplier chain performance is calculated by the total of supplier's expected profit ($\Pi^S(Q, \xi) = w \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q) - cQ$) and retailer's expected profit ($\Pi^R(Q, \xi) = (r - w) \mathbb{E}_\varepsilon \min(\xi + \varepsilon, Q)$). Results indicated that Female-Female team earned significantly more profit than the other three gender composition. This result is consistent with the previous literature. However, profits among Male-Male team, Female-Male team, and Male-Female team were not significantly different from each other.

Discussions and Conclusions

Current trends in the nature of workforce imply that mixed-gender teams will increasingly be called upon to perform work. The empirical literature suggests that this may create a problem in the sense that, on the traditional male-dominated tasks, teams that composed of all male members have been found to outperform teams that included female members (Wood, 1987). Essay 2 was designed to understand the influence of gender composition on trust, trustworthiness, collaboration, and performance in buyer-supplier relationships. We have shown that Female-Female teams were significantly outperformed among any other gender compositions. This result is consistent with Apesteguia et al. (2012). Several key findings emerged from this study. First, subjects in the same gender teams trusted their partner's ability more than those in the different gender teams. Social identity theory can well-explain this finding—individuals identified with each other due to the same gender and generated the in-group favoritism and out-group discrimination. Further, subjects in the Female-Female treatment trusted their partner's ability more than those in the Male-Male treatment. This result indicated that females were more trustworthy than males. In addition, Male-Female treatment had the lowest trust in ability. This result suggested that males might have the stereotype that females could not do a math-related job such as forecasting well.

Second, in terms of integrity, subjects in the same gender treatments significantly trusted their partners' integrity more than those in the different gender treatments. According to the social identity theory, identification created the positive in-group bias and people believed that their in-group members were doing favors to them.

Similarly, subjects in the same gender treatments trusted their partner's benevolence more than those in the different gender treatments. This result provided the evidence that

subjects in the same gender treatments believed that their partners more concerned about their welfare and were more willing to help them compared to those in the different gender treatments. Consistent with previously literature, subjects tended to trust their in-group members more than their out-group members. Further, males trusted more than females especially when two males worked together.

In addition, when it came to the real behavior—collaboration, stories have been changed. Female retailers were most collaborative with their female partners and males retailers were least collaborative with their male partners in all gender composition teams. That might indicate that males were more competitive than females especially when they paired with another male. For suppliers who had to rely on their retailers' forecast report to make the production, the in-group favoritism played a role again. Subjects in the same gender treatments cut down their production reduction less compared to those in the different gender treatments. This result provided the evidence that they were more collaborative. This might be explained by the trust concept that subjects trusted their in-group members more than their out-group members, thus they were more collaborative.

Consistent with previous literature, the Female-Female team was outperformed among the other three team compositions. This result provided the evidence that females are important in the supply chain which is a male-dominant career.

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IV. CONCLUSION AND FUTURE RESEARCH

This dissertation investigated and obtained a holistic understanding of the importance and impacts of identity on collaboration, trust, trustworthiness, and performance in buyer-supplier relationships. By considering two types of identity—induced identity and natural identity, this dissertation employed controlled lab experiments to provide interesting insights and contributions. Taken as a whole, several grand findings and contributions of this dissertation emerged to understand the identity issues in buyer-supplier relationships.

In a grand scheme, this dissertation provided the evidence that identity acted as a non-economic factor that could promote discretionary collaboration, trust, trustworthiness, and increase performance in buyer-supplier relationships. Previous literature has shown that economic incentives and complete contracts could make retailers and suppliers work together toward the common goals and mutual benefits. However, how to motivate self-interested individuals to voluntarily collaborate becomes the issue. Even though the monetary incentive is the most common method to promote collaboration between suppliers and retailers, it does have downsides such as crowding out the intrinsic motivation or leading to dishonesty. The contract can prevent the negative sides of monetary incentives, but it is costly to make a complete contract. Therefore, this dissertation introduced identity as the non-economic factor that can promote discretionary collaboration which would avoid the negative sides of the monetary incentives and incomplete contracts.

In Essay 1, I introduced the buyer-supplier identification—the induced identity to supply chain management literature. By creating the identity between an employee from the supplier/retailer firm and a retailer/supplier firm (the employee generated the identity with his/her partner's firm), I am able to understand that the buyer-supplier identification can increase discretionary collaboration and supply chain performance. Both suppliers and retailers were

willing to sacrifice their own interest to benefit their partners and the supply chain with the presence of buyer-supplier identification. This result indicated that opportunism might be reduced between suppliers and retailers since they treated each other as their in-group members and they were no longer self-profit oriented agents. Supply chain managers may consider using buyer-supplier identification to work more effectively and efficiently with their supply chain partners. For example, even though there is goal incongruence between suppliers and retailers, buyer-supplier identification might be strong enough to avoid the negative impacts.

Second, this study also explored the foundation and formation of buyer-supplier identification. There are different ways to manipulate buyer-supplier identification from the minimum group paradigm to collocation. Previous literature has already shown that the trivial things such as assigning subjects into green/red groups or forming groups by painting preferences are sufficient enough to trigger identity. However, this study provided evidence that collocation might further enhance the identity between suppliers and retailers. This result might be able to explain the phenomenon in practice that major retailers highly recommend their suppliers to have dedicated teams that collocate with them. This result suggested that beyond the operational benefits such as more information sharing or faster decision-making process, collocation could also bring behavioral benefits such as creating buyer-supplier identification. Further, the buyer-supplier identification created through collocation can promote discretionary collaboration which benefited both suppliers and retailers and the supply chain. Supply chain managers may consider using the above methods to form buyer-supplier identification. For example, simply sharing the same email address between suppliers and retailers' firms may be sufficient enough to trigger buyer-supplier identification. Providing T-shirt with joint company names and logos might be another way to prime employees' identity with their partner firms.

Further, team-building activities can be used to enhance buyer-supplier identification. Managers may use team-building events outside the business to make employees work together. In addition, dedicated team collocation is the strongest way to create buyer-supplier identification. Therefore, even though it is costly for suppliers to have a dedicated team to collocate with the major retailers, it might be worth investing the money.

Third, results indicated that suppliers benefit more than retailers by generating buyer-supplier identification. This helps us further understand collocation. Power exists in many buyer-supplier relationships, and in most cases, retailers are more powerful than suppliers. People may argue that collocation with the retailer is the result of the retailer's power. However, the result from this study clearly shows that suppliers can earn more profits by collocating with their partners. Therefore, power might be one of the reasons that promote collocation, but it is not the only reason.

As we discussed before, power exists in the buyer-supplier relationships. Future research may take power into consideration when exploring identity issues. For example, is it different to form buyer-supplier identification in the power imbalanced relationships? Second, this study only explored the two-tier supply chain—a relationship between one supplier and one retailer. In the real world, a major retailer has several major suppliers to provide similar products. If the focal supplier has generated the buyer-supplier identification with the major retailer, how does he/she treat the major retailer's other suppliers? Does the focal supplier treat other suppliers who offer the similar products as competitors or in-group members? Third, as the world developed, global supply chain becomes more and more popular. The retailer located in the US may have suppliers from China. Therefore, the culture differences may play a role in the relationship. It

may generate different ways to create buyer-supplier identification with various cultures. Future research may explore the formation and foundation of identity under different cultures.

In Essay 2, the focus was the impact of gender identity. Previous literature has documented the gender differences in various aspects such as risk preference, social preference, and competition. This study examined the impact of gender composition on trust, trustworthiness, collaboration, and performance in buyer-supplier relationships. The result suggested that Female-Female teams were significantly outperformed among any other gender compositions. Supply chain is a male-dominated career, and according to this result, bringing more females to the supply chain field could improve the supply chain performance. Supply chain managers may consider having a female employee in the buyer-supplier relationships if the partner is a female.

Second, according to social identity theory, same gender teams exhibited higher level of trust and trustworthiness. The results from this essay provided similar conclusions. Supply chain managers may consider using the same gender composition as a criterion to assign employees if they want to achieve higher level of trust and trustworthiness. If the partner is a female, it might be better to assign another female to work with her. On the contrary, if the partner is a male, assigning another male to work with him might achieve efficiency and effectiveness.

However, males exhibited inconsistency with their perceptions and real behaviors. When it comes to the real behavior—collaboration, stories have changed for males. Even though males stated that they trusted their male partners more than their female partners, they competed more with their male partners in the real task than their female partners. Therefore, competition among males can dominate the in-group favoritism. Males can form groups by their gender, but they still compete with other males even though they are in the same group. However, females were

more consistent with their perceptions and real behaviors in this study. Female retailers were significantly more collaborative with their female partners. When forming relationships, managers may consider avoiding the male-male group due to the nature of competition among males. This result provided further evidence that females played a significant positive role in buyer-supplier relationships.

Gender is not the only part of individuals' natural identity. Ethnicity is another factor that might change individuals' behaviors. As the world becomes more and more diverse, how to promote people from different backgrounds to work together is the key for firms to succeed and survive. Therefore, how gender and ethnicity twisted with each other to impact individuals' decision-making is another direction to go for the future research.

V. APPENDIX



April 8, 2016

MEMORANDUM

TO: Siqi Ma
John Aloysius

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 16-03-657

Protocol Title: *Supply Chain Decision Making*

Review Type: ☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB

Approved Project Period: Start Date: 04/08/2016 Expiration Date: 04/07/2017

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<https://vpred.uark.edu/units/rscpl/index.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 600 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.