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HOW MUCH WILLINGNESS TO SHARE INFORMATION AFFECTS SOCIAL EXCHANGE FACTORS IN SUPPLY CHAINS

Abstract:

Information sharing is crucial for supply chains to collaborate, improve their performance, and achieve competitive advantage. Some of this sharing is done automatically but normally it involves humans and their individual willingness to share information plays an important role. Currently, the application of sociological theories like social exchange theory (SET) is limited in the behavioral supply chain field. The purpose is to study the effect of willingness to share quality information by SET motivation factor like reciprocity in supply chains. A quantitative approach consisting of a cross-sectional survey of 387 respondents was used. An extensive moderation analysis in SPSS was carried out using Hayes Process tool to study the moderating role of willingness for reciprocity to share quality information. The techniques used were regression slopes analysis and John-Neyman approach to quantify moderation. The research showed when willingness is low, reciprocity plays a major role in information sharing quality, and when willingness is high, it strengthens the relationship of reciprocal relationship for information sharing quality. Our research thus brings a deeper insight into the human issues faced during information sharing in supply chains.

Keywords:

Human Issues; Information Sharing; Behavioral Supply Chains; Social Exchange Theory; Moderation Analysis

1. Introduction:

Information sharing is vital for supply chains (SC) to collaborate and improve their performance (Trkman et al., 2010). This sharing is partly automatic but it usually involves humans and their willingness to share might hamper information sharing and information quality (Fawcett et al., 2011).

Social exchange theory (SET) is based on a cost-reward system that motivates humans to share (Emerson, 1976) and humans expect reciprocity once information is shared (Chen and Hung, 2010). In our conference paper, we share the initial results of our study on how willingness to share affects reciprocal relationship of SC partners for shared information and quality.

The structure of this paper is as follows: we firstly briefly summarize the literature. Then we present the research design followed by moderation testing, data analysis and results. Main findings are discussed in the conclusion.

2. Literature Review

Willingness is defined as the openness and intention to share information between SC partners and also determines the extent to which information is shared (Fawcett et al., 2007). To collaborate, SC partners need to 'willingly' provide data related to operations and information related to finances and strategy (Kwon and Suh, 2005).

Social exchange theory is now being used in literature to understand information exchange (Wu et al., 2014). While One of the key factors of SET is reciprocal relationship (Cropanzano and Mitchell, 2005). Reciprocity is the willingness to meet the needs of another person or organizational unit with the anticipation of receiving similar behavior in return (Barua and Ravindran, 1996). Griffith et al., (2006) operationalized reciprocity as if SC member A treats B fairly for processes and rewards; B exhibits attitudes and behaviour that strengthens the partnership. Bock et al. (2005) found a significant relationship between willingness and reciprocity.

Information sharing and its quality means that the 'extent' of information shared information is timely, complete, adequate, reliable, and accurate (Li and Lin, 2006); Nicolaou et al., 2013). According to Lin (2007) attitudes of information sharing intentions (i.e. willingness) and information sharing will not occur without such reciprocity.

Based on this, we develop our hypothesis that willingness to share (WS) information positively influences the relationship of reciprocity (RS) and information sharing quality (ISQ) in SCs. Figure 1 shows this conceptual model.

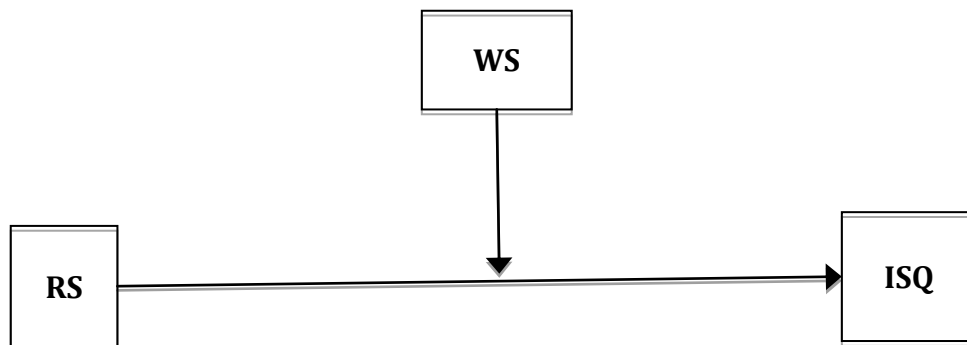


Figure 1: Conceptual Model of Moderation of willingness to share information.

3. Research Design and Instrumentation

After conducting two pilot study rounds that entailed modifying the questionnaire for targeted audience, data of 387 respondents from SC company employees in Pakistan was collected using previously developed instruments for reciprocity, willingness to share and Information sharing quality.

Griffith et al.'s (2006) instrument for measuring reciprocity that they modified for SC context was used. A seven-point balanced Likert scale instrument developed by Fawcett et al. (2007; 2011) was used to measure willingness to share. And, information sharing and its quality with suppliers were operationalized by the construct developed by Li and Lin (2006) called 'Information Sharing Quality' that measures information-sharing level and quality.

3.1 Moderation

Moderation is a situation that refers to the combined effect of two variables (one variable is x or predictor and the other is called moderator or m) on the y or outcome variable (Baron and Kenny, 1989). In order to check the moderation effect, tests will be conducted to check the moderating role of willingness (WS) on outcome or y variable: information sharing quality (ISQ) using predictor variable ' x ' in the model which is reciprocity (RS) in this case. Figure 1 shows the moderation of willingness that will be tested. The equation representing this moderation concept is a multiple regression equation:

$$ISQ_i = (b_0 + b_1 X_{1i} + b_2 WS_i + b_3 Interaction_i) + \varepsilon_i$$

Here, Interaction means the product of predictor ' x ' (RS) and moderator willingness (WS) variables. Epsilon (ε) is the error term.

For moderation, b_2 coefficient represents the regression of WS on ISQ when X_1 (RS) is zero (vice versa for b_1). In the presence of the interaction term the coefficients b_1 and b_2 may become un-interpretable. For this reason, it is a common practice (Field, 2013) to transform X and WS variables using grand mean centring that makes the interpretation of b_1 and b_2 easy. In our case, for instance, b_2 will show the effect of WS

at the mean value of the sample and represents the average value of WS across the range of scores of x predictor (RS).

3.2. Moderation Testing and Approaches

Hayes (2013) PROCESS module for SPSS will be used to test the moderating effect of WS on ISQ (outcome variable in this case) and RS predictor variable. Basic moderation model number 1 will be used with 1000 bootstrapped samples. Means will be centred for moderator (willingness) and each of the predictor variables of the model using ± 1 standard deviations. With these centred mean data, interaction term will be calculated using forced entry regression that will help examine the sources of bias model. If the interaction term is found significant, it will indicate moderation. However, to understand the nature of the relationship e.g. if the relationship between x and y is positive and becomes strong with positive values of moderator variable, we will apply three analysis approaches: (1) Johnson Neyman (1936) approach, (2) simple slopes analysis (Aiken and West, 1991) and (3) Line graph of the slopes (Field, 2013).

Johnson Neyman approach shows the how the values of x and y change at different values of moderator variable, simple slope analysis shows them at low, medium and high values of moderator, whereas line graph complements these approaches by showing the moderating role graphically (Field, 2013).

4. Data Analysis and Results

For all values of willingness to share (WS) the relationship between reciprocity with suppliers (RS) and information sharing quality (ISQ) was found significant ($p < 0.05$). Hence, moderation effect of WS was found between RS and ISQ relationship with R^2 0.42. The results of the moderation tests are shown in Table 1.

Table 1: Linear Model of Predictors (RS and WS) of Information Sharing Quality

| Outcome: ISQ | | | | | | |
|--------------|---------------|--------|---------|-----|-----|---|
| Model | Summary | | | | | |
| R | R-sq | MSE | F | df1 | df2 | p |
| 0.6477 | 0.4195 | 0.7038 | 83.7338 | 3 | 383 | 0 |

| Model | b (Effect) | SE B | t | p | LLCI | ULCI |
|---------------|------------|--------|----------|--------|--------|---------|
| Constant | 5.0486 | 0.0465 | 108.6864 | 0 | 4.9573 | 5.14 |
| WS (centered) | 0.406 | 0.0526 | 7.717 | 0 | 0.3026 | 0.5095 |
| RS (centered) | 0.3555 | 0.0526 | 6.7589 | 0 | 0.2521 | 0.459 |
| int_1 | -0.0836 | 0.0363 | -2.3058 | 0.0217 | -0.155 | -0.0123 |

| Interactions: | int_1 | RS | X | WS |
|---------------|-------|----|---|----|
| | | | | |

To further analyse the nature of the relationship, the three approaches (Johnson and Neyman approach, simple slopes analysis, line graph) discussed above have been used:

Table 2: Johnson-Neyman Analysis Values Showing Regions

| WS | Effect | se | t | p | LLCI | ULCI | |
|---------|--------|--------|--------|--------|---------|--------|-----------------|
| -3.8986 | 0.6816 | 0.1462 | 4.6613 | 0 | 0.3941 | 0.9692 | |
| -3.5986 | 0.6565 | 0.1361 | 4.823 | 0 | 0.3889 | 0.9242 | |
| -3.2986 | 0.6315 | 0.1262 | 5.0054 | 0 | 0.3834 | 0.8795 | |
| -2.9986 | 0.6064 | 0.1163 | 5.2119 | 0 | 0.3776 | 0.8351 | |
| -2.6986 | 0.5813 | 0.1067 | 5.4458 | 0 | 0.3714 | 0.7911 | |
| -2.3986 | 0.5562 | 0.0974 | 5.7101 | 0 | 0.3647 | 0.7477 | |
| -2.0986 | 0.5311 | 0.0884 | 6.0064 | 0 | 0.3572 | 0.7049 | |
| -1.7986 | 0.506 | 0.0799 | 6.3318 | 0 | 0.3489 | 0.6631 | |
| -1.4986 | 0.4809 | 0.072 | 6.6747 | 0 | 0.3392 | 0.6226 | |
| -1.1986 | 0.4558 | 0.0651 | 7.0061 | 0 | 0.3279 | 0.5837 | |
| -0.8986 | 0.4307 | 0.0593 | 7.2689 | 0 | 0.3142 | 0.5472 | Significant |
| -0.5986 | 0.4056 | 0.055 | 7.3731 | 0 | 0.2974 | 0.5138 | |
| -0.2986 | 0.3805 | 0.0527 | 7.2188 | 0 | 0.2769 | 0.4842 | |
| 0.0014 | 0.3554 | 0.0526 | 6.756 | 0 | 0.252 | 0.4589 | |
| 0.3014 | 0.3303 | 0.0547 | 6.0374 | 0 | 0.2228 | 0.4379 | |
| 0.6014 | 0.3052 | 0.0588 | 5.1919 | 0 | 0.1896 | 0.4208 | |
| 0.9014 | 0.2801 | 0.0645 | 4.3455 | 0 | 0.1534 | 0.4069 | |
| 1.2014 | 0.2551 | 0.0714 | 3.574 | 0.0004 | 0.1147 | 0.3954 | |
| 1.5014 | 0.23 | 0.0792 | 2.905 | 0.0039 | 0.0743 | 0.3856 | |
| 1.8014 | 0.2049 | 0.0876 | 2.3383 | 0.0199 | 0.0326 | 0.3771 | |
| 2.0311 | 0.1857 | 0.0944 | 1.9662 | 0.05 | 0 | 0.3713 | |
| 2.1014 | 0.1798 | 0.0966 | 1.8618 | 0.0634 | -0.0101 | 0.3696 | Not Significant |

4.1 Moderation Approach 1: Johnson-Neyman Method

To analyse the above relationship between the three variables, Johnson-Neyman method is used that gives the value of RS as a predictor of ISQ at different values of moderator, WS shown in table below. The boundary of the region of significance is 2.03 with about 97.2% of the values below it and only 2.8% in the region of non-significance. It seems that when willingness is low reciprocity has a major effect.

4.2 Moderation Approach 2: Simple Slopes Analysis

To further analyse the above relationship between the three variables, simple slopes analysis was carried out. It shows three different regressions (Table 3). for RS as a predictor of ISQ: (1) when WS is low i.e. -1.126; (2) at the mean value of WS which is zero in this case as it is centred; and (3) when WS is high i.e. 1.126.

Table 3: Simple Slope Analysis of Predictors (RS and WS) of Information Sharing Quality

| WS | b (Effect) | SE | t | p | LLCI | ULCI |
|---------|------------|--------|--------|--------|--------|--------|
| -1.1259 | 0.4497 | 0.0635 | 7.079 | 0 | 0.3248 | 0.5746 |
| 0 | 0.3555 | 0.0526 | 6.7589 | 0 | 0.2521 | 0.459 |
| 1.1259 | 0.2614 | 0.0695 | 3.759 | 0.0002 | 0.1247 | 0.3981 |

The results show that

1. When WS is low, there is a significant positive relationship between RS and ISQ. In addition, the effect is quite high, $b=0.449$.
2. At the mean value of WS, there is significant positive relationship between RS and ISQ. The effect is slightly lower, $b=0.356$.
3. When WS is high, there is significant positive relationship between RS and ISQ. The effect is the lower than earlier, $b=0.261$.

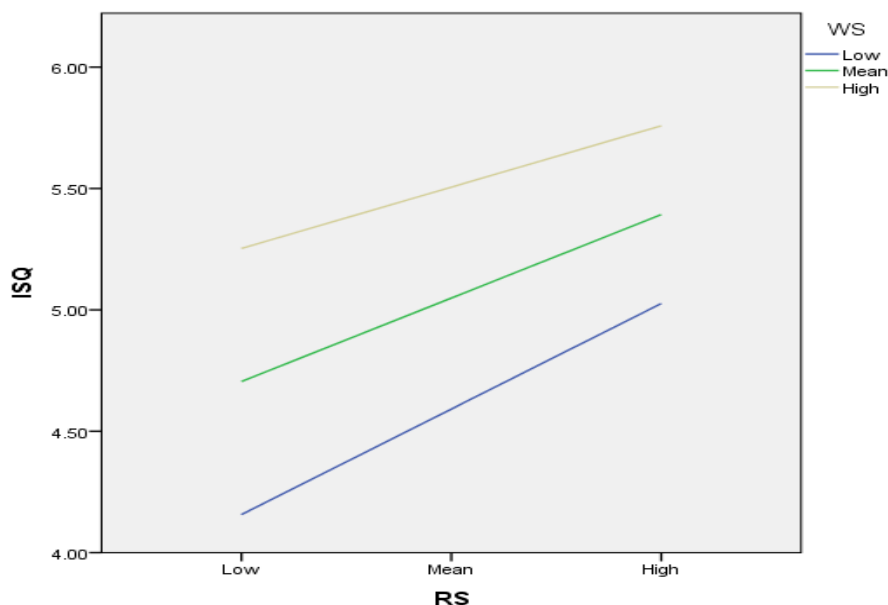


Figure 2: Simple Slope Equations of the Regression of ISQ on RS at Three Levels of WS

4.3 Moderation Approach 3: Line Graph

To bring a clearer understanding of the moderating relation of WS, a line graph for the values is shown above (Field, 2013). The interpretation of the line graph is that when willingness is low (blue or lowest line) there is a big positive relationship between RS and ISQ; at the mean value of willingness (green or middle line) there is a again a big positive relationship between RS and ISQ; and this relationship gets even stronger at high levels of WS (beige or top line).

The results from the three approaches show that moderation exists thus, we accept our hypothesis presented in section 2.

5. Conclusion

We studied the role of willingness as a moderator in the reciprocal relationship for information sharing quality. Results from the extensive moderation analysis using three approaches indicate that when both willingness and reciprocity are low, information sharing quality is not good. When both willingness and reciprocity are high, information sharing quality is the most. When, willingness is low, reciprocity plays a major role in information sharing quality. Basically, this can be interpreted as that when employees are in general not willing to share they will still be prepared to share with those SC partner individuals where reciprocity is highly expected. Thus, a company with employees with low willingness should emphasize to them that they will also get information themselves from these partners when needed, if they follow a give and take (I do you a favour, you do me a favour) relationship.

We empirically show the moderating role of willingness to share for reciprocity (give and take) affecting information sharing and quality. Managers can use our research for not only to understand the effect of willingness to share data with another individual and their reciprocal relationship but also to improve shared information and its quality.

6. References

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