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INTERPERSONAL COMMUNICATION SKILLS OF INDUSTRIAL ENGINEERS: A CASE STUDY

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ABSTRACT

Various studies have been carried out to find the need of Interpersonal Communication Skills in across several professions and how it is impacting individual's performance but these studies did not put much light on its requirement for Industrial Engineers. Therefore it triggers the need for studying the role of Interpersonal communication Skills in Industrial Engineer's profession. To investigate the interpersonal communication skills of industrial engineers, the subjects varying across the fields of IT, Marketing and Operations were given Spitzberg & Cupach's questionnaire that comprises of 18 items on Interpersonal Communication Competence; evaluated on 5 point Likert scale. Factor Analysis was conducted to divide the responses into significant factors. ANOVA was done to differentiate Industrial Engineers coming from several sectors, on the accountability of identified factors. From the study it has been found that Industrial Engineers in SCM/Operations and Marketing firms behave in similar fashion most of the times with above average (4 points on Likert scale of 5) competence in all aspects of Interpersonal Communication Skills but IT Industrial Engineers scored average (3 points on Likert scale of 5) competence level in it. There is a scope of improvement in Interpersonal communication competence of IT Industrial Engineers and further studies can be carried out on how Interpersonal communication competence is impacting Industrial Engineer's performance across various sectors.

KEYWORDS

Interpersonal Communication Competence, Industrial Engineers, Spitzberg & Cupach's questionnaire, Likert scale, ANOVA.

1. INTRODUCTION

Interpersonal Communication Skills is defined as ability of an individual to communicate with others. This requires effective listening, paraphrasing and exchange of information between two or more people. There are several studies which have been reported with reference to Interpersonal Communication skills. My objective of study was to study the Interpersonal Communication competence of Industrial Engineers. For this study was conducted in which Factor Analysis was carried out. It resulted into 4 factors which are in line with what mentioned in Spitzberg & Cupach's Competence model. Furthermore, to strengthen the study Descriptive Analysis and to statistically evaluate it ANOVA is carried out.

Industrial Engineering is Human Effort Engineering and System Efficiency Engineering which is an engineering based management discipline that deals with design of human effort and system efficiency in all occupations: agricultural, manufacturing and service(Rao,2009) .It is concerned with the useful coordination of men, materials and machines in order to achieve desired results in an optimum manner (Lehrer, 1954).As the work has to be carried out by people so engineering knowledge needs to be supplemented by knowledge derived from biological and social sciences(Urwick,1963).

All the above definitions of Industrial Engineering talk about the need of Human effort in various occupations. It stresses on useful coordination of men, material and machines which needs to be supplemented by social sciences.

Interpersonal Communication Skills, being the integral part of social sciences plays a great role in the coordination of men and design of human effort .It is referred to as people skills and the ability to communicate effectively, to handle difficult conversation in such a manner that problems are resolved easily (Roble's Formulation).It is a systematic, unique and a continuous process of interaction between individuals and by individuals who make reflections and build personal knowledge of each other while creating and sharing meanings and forming relationships(Trenholm and Jensen,1992;Fisher and Adams, 1994; Wood 2002).

The above arguments state that there is a need of Interpersonal communication Skills in Industrial engineering field.

2. LITERATURE REVIEW

The purpose of literature review is to explore the need of Interpersonal communication Skills in Industrial engineering and how it is impacting individual's performance. The insights of literature review may be helpful in bringing information that could help in increasing system/organization efficiency. Classic research by Herzberg (1968) demonstrated that a worker's motivation to do excellent work is not tied to pay or benefits. Instead, Herzberg found that motivation is the result of having interesting, challenging work that allows an employee to achieve and to feel recognized. In 1978 a Fortune magazine survey of the top 500 corporate leaders, identified communication as most noted problem. According to monthly newsletter entitled Communication Briefing, ineffective communication results in poor cooperation and coordination, lower productivity, undercurrents of tension, gossip and rumours, increased turnover and absenteeism. There is a potential for conflict, divisiveness, destructiveness, creativity, task accomplishment and friendship when people are brought together to work in a common environment and for a common purpose (Jerry Johnson, 1984). Thomas Swan states that effective communication must have two things happening simultaneously, information must be accurately presented and second, it must be accurately received and interpreted by the listener. Swan also discusses two primary barriers to communications; people sometimes fail to understand the message because they daydream instead of listening to the message. Second, people do not agree with the listener's attitude or beliefs, which may cause dissonance (Swan, 1992, pg.79). Steven Mihelic in his research project Changing Organizational Culture (1995) states that communication is a vital part in the changing of process and culture. He also emphasizes that communication must be meaningful and sincere. He goes on to say that people must be listened to and believe that their input is of value (Mihelic, 1995 pg.13).An organization with constant interpersonal relationship failures, will have trouble meeting basic department goals and objectives (Ozog, 1996, p.14). Ozog goes on to state there are situations that hampers or create friction in interpersonal relationships, and he lists several causes:

- Unclear performance standards can create an atmosphere destined for trouble.
- The ability to maintain effective relationships will be difficult if individuals have had past problems.
- Employee stress is increased when the department has no clear mission; no one knows what other team members are doing.
- Top down management philosophy destroys trust needed for good interpersonal communication.
- Unclear communication process creates miscommunications, which hamper completion of projects.

- Ozog goes on to explain most managers that they must communicate on a daily basis and it is essential that they plan and practice responses prior to specific situations. He offers the following guidelines to assist in planning your response.
- It is essential to take the time to gather your thoughts before you respond.
- Never attempt to communicate when you are angry.
- Be prepared to give specific and honest feedback in interactions, which may be difficult, if the information is not favourable to the receiver.
- Avoid scare or pressure tactics in interactions.
- Be consistent when dealing with people, it is essential for building interpersonal relationships.
- Follow through on all commitments and admit when you make a mistake.
- When providing discipline, constructive criticism, do it in private and respect confidentiality (Ozog, 1996, pg.15).

Poor communication results into poor morale and incomplete work assignment (Metcalf, 1999). (Sandelands and Boudens, 2000) demonstrated that “the meaning of work derives from the connections with co-workers, not from the work itself”. They concluded that workers perform better when they are happily engaged in what they do. It has been found that employees who energized co-workers with better performance evaluations got promoted faster (Cross and Parker, 2004). (Lim, Cortina, and Magley, 2008), taking a different track in their research, found that incivility and feelings of disrespect negatively affected job satisfaction and attitude toward work. Beyond effecting workers’ emotions, interpersonal relationships can affect career paths. That is, companies often reward employees who have positive influences on co-workers’ attitude toward work. (Reinsch and Gardener, 2011) reported the results of a national survey of senior business executives citing that employees with strong interpersonal skills are most likely to be considered for promotions. The work environment has long been recognized as having a profound effect on employee performance. Workers’ attitudes toward their managers, co-workers, and organizations are usually reflected in their output. In *The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work*, (Amabile and Kramer, 2011) describe the effects of employee engagement in detail. They studied 238 professionals in seven different companies in three industries, charting the employees’ psychological state each day for 2 years, as reflected in electronic diary entries. Their analysis revealed the subject’s “inner work lives” - perceptions, emotions, and motivations that they experienced as they made sense of their work-day. The study found that employees’ inner work lives influenced performance on four dimensions: creativity, productivity, work commitment, and collegiality.

3. NEED OF STUDY

Interpersonal Communication skills are relevant in various professions but these studies did not put much light on its requirement for Industrial Engineers. Therefore it triggers the need for studying the role of Interpersonal communication Skills in Industrial Engineer’s profession.

4. OBJECTIVES OF STUDY

1. To study Interpersonal Communication Skills among Industrial Engineers working in different sectors.
2. To factor analyse and validate the tool used for the above study.
3. To make appropriate recommendations in lieu of above findings.

FIGURE 1: YEAR WISE SEGMENTATION OF RESEARCH INSIGHTS ON INTERPERSONAL COMMUNICATION SKILLS

Year	Author	Research Insights
1968	Herzberg	Motivation is the result of having interesting, challenging work that allows an employee to achieve and to feel recognized and is not tied up to pay and benefits
1978	Fortune Magazine survey	Among top 500 corporate leaders, communication was identified as most noted problem.
1984	Jerry Johnson	There is a potential for conflict, divisiveness, destructiveness, creativity, task accomplishment and friendship when people are brought together to work in a common environment and for a common purpose
1992	Swan	Effective communications must have two things: information must be accurately presented and it must be accurately received and interpreted by the listener
1995	Steven Mihelic	Communication is a vital part in the changing of process and culture
1996	Ozog	An organization with constant interpersonal relationship failures, will have trouble meeting basic department goals and objectives
1999	Metcalf	Poor communication results into poor morale and incomplete work assignment
2000	Sandelands and Boudens	The meaning of work derives from the connections with co-workers, not from the work itself
2004	Cross and Parker	Employees who energized co-workers were given better performance evaluations and were promoted faster
2008	Lim, Cortina, and Magley	Incivility and feelings of disrespect negatively affected job satisfaction and attitude toward work
2011	Reinsch and Gardener	Employees with strong interpersonal skills are most likely to be considered for promotions
2011	Amabile and Kramer	Employees inner work lives influenced performance on 4 dimensions: creativity, productivity, work commitment, and collegiality.

5. RESEARCH METHODOLOGY

For the purpose of Interpersonal Communication Competence, *Spitzberg & Cupach’s* presented a tool that comprises of 18 items evaluated on 5 point Likert scale. The scale is presented below:

FIGURE 2: LIKERT SCALE

1	2	3	4	5
Strongly Disagree	Slightly Disagree	Unsure	Slightly Agree	Strongly Agree

Study was conducted using *Spitzberg & Cupach’s* questionnaire. For the purpose of collecting the data personal mails were sent to more than 50 Industrial Engineers. Also effort was done to communicate with respondents through Facebook groups. Hard Copy of Questionnaire was sent to NITIE faculties who are Industrial Engineers. Only 45 responses were collected and 30 qualified for the purpose of our evaluation, remaining 15 were rejected on the grounds of inadequacy of data or incomplete information.

Factor Analysis was conducted using SPSS 16. ANOVA was done to differentiate Industrial Engineers coming from several sectors, on the accountability of identified factors.

6. RESULTS AND DISCUSSIONS

Factor Analysis on 30*18 respondents was conducted using Principal Component method and varimax with Kaiser Normalized Rotation using SPSS 16. The KMO measure of sample inadequacy was found to be 0.578 and is significant. The cumulative total variance explained was found to be 72.94% indicative of having 4 factors out of 16 eligible items. Out of 18 items only 16 items were retained and 2 items were rejected due to cross loadings.

Extraction value ranges from 0.827 to 0.515. The adequate internal consistency of the 4 factors with Cronbach Alpha was 0.83, 0.79, 0.79 and 0.74 respectively. These factors were named as:

1. Involvement in Conversation
2. Reflection
3. Openness and Adaptability
4. Ability to Communicate

1. **Involvement in Conversation:** Items (4, 6, 18, 11, and 7) are included under it which describes involvement and explains one’s choice of being involved with others and showing empathy towards others.
2. **Reflection:** Items(12, 16, and 5) are included under it which describes understanding of others by reflecting their thoughts and feelings to them and one’s appropriateness in communication
3. **Openness and Adaptability:** Items (10, 2, 8, 9, and 7) are included under it which describes enough knowledge and experiences to adapt to others’ expectations, understanding other people’s viewpoints and to manage the tone of conversation.
4. **Ability to Communicate:** Items (14, 13, and 3) are included under it which describes wide range of behaviours, including self-disclosure and wit, to adapt to others and one’s motivation to obtain the conversational goals.

All the above 4 factors extracted from our study are aligned with what explained in *Spitzberg & Cupach’s* Competence model.

The rotated component matrix is presented in figure 1 below:

FIGURE 1: ROTATED COMPONENT MATRIX

		Rotated Component Matrix(a)					
		Component					
SN	Items	1	2	3	4	5	Cronbach Alpha
1	VAR00004	0.827	0.131	-0.129	0.125	0.128	0.83
	VAR00018	0.773	0.12	0.259	0.139	-0.17	
	VAR00006	0.768	0.315	0.244	-0.012	-0.046	
	VAR00011	0.648	0.355	0.408	0.117	-0.013	
	VAR00007	0.604	0.571	0.122	0.212	-0.154	
2	VAR00012	0.168	0.8	0.063	0.116	0.131	0.79
	VAR00016	0.404	0.771	0.173	-0.054	0.003	
	VAR00005	0.364	0.542	0.321	0.195	0.339	
3	VAR00010	0.26	0.35	0.768	-0.052	-0.084	0.79
	VAR00002	0.076	-0.065	0.666	0.313	0.17	
	VAR00008	-0.013	0.262	0.665	0.317	-0.11	
	VAR00009	0.485	-0.489	0.618	-0.033	0.181	
	VAR00017	0.409	0.199	0.515	0.437	0.16	
4	VAR00014	0.125	0.048	0.077	0.883	0.054	0.74
	VAR00013	-0.022	0.05	0.298	0.784	-0.037	
	VAR00003	0.435	0.181	0.07	0.612	0.312	
5	VAR00015	-0.008	0.193	0.095	0.212	0.793	DROPPED
	VAR00001	0.216	0.476	0.136	0.306	-0.579	
Extraction Method: Principal Component Analysis.							
Rotation Method: Varimax with Kaiser Normalization.							
a. Rotation converged in 11 iterations.							

The component factor matrix shows negative correlations or weak positive correlations in most of the cases explaining independence from each other. The details are presented in figure 2.

FIGURE 2: COMPONENT TRANSFORMATION MATRIX

		Component Transformation Matrix			
Component	Involvement	Reflection	Openness and Adaptability	Ability to communicate	
Involvement	0.638	0.48	0.468	0.374	
Reflection	-0.321	-0.493	0.417	0.321	
Openness and Adaptability	-0.44	0.596	-0.429	0.515	
Ability to communicate	0.4	-0.153	-0.502	0.032	
Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.					

To strengthen our findings the descriptive analysis has been presented in figure 3 below:

FIGURE 3: DESCRIPTIVE ANALYSIS

		N	Mean	Minimum	Maximum
INVOLVEMENT	SCM/OP's	17	3.8588	1.4	4.8
	IT	9	3.2	1	4.2
	Marketing	3	4.4	4	5
	Others	1	3.4	3.4	3.4
	Total	30	3.7	1	5
REFLECTION	SCM/OP's	17	3.7843	1.33	4.67
	IT	9	3.4815	1.33	4.67
	Marketing	3	3.8889	3.33	4.33
	Others	1	4.6667	4.67	4.67
	Total	30	3.7333	1.33	4.67
OPENNESS AND ADAPTABILITY	SCM/OP's	17	3.6588	2.6	4.8
	IT	9	3.1778	1.6	4.6
	Marketing	3	4.0667	3.4	4.4
	Others	1	3.6	3.6	3.6
	Total	30	3.5533	1.6	4.8
ABILITY TO COMMUNICATE	SCM/OP's	17	3.6471	1.67	5
	IT	9	3.1111	2	4.67
	Marketing	3	4.1111	3	4.67
	Others	1	3.3333	3.33	3.33
	Total	30	3.5222	1.67	5

All Industrial Engineers in SCM/Op's and Marketing firms slightly agree in terms of their involvement in communication whereas Industrial Engineers in IT firms are unsure about their involvement in communication.

All Industrial Engineers in SCM/Op's and Marketing firms slightly agree in terms of their Reflection whereas Industrial Engineers in IT firms are unsure about their Reflection factor of communication.

All Industrial Engineers in SCM/Op's and Marketing firms slightly agree in terms of their Openness and Adaptability whereas Industrial Engineers in IT firms are unsure about their Openness and Adaptability factor of communication.

All Industrial Engineers in SCM/Op's and Marketing firms slightly agree in terms of their Communicational Ability whereas Industrial Engineers in IT firms are unsure about their Communicational Ability factor of communication.

From all the above discussion it has been found that Industrial Engineers in SCM/Operations and Marketing firms behave in similar fashion most of the times with above average (4 points on Likert scale of 5) competence in all aspects of Interpersonal Communication Skills but IT Industrial Engineers scored average (3 points on Likert scale of 5) competence level in it.

For the purpose of statistical evaluation ANOVA was conducted as shown in figure 4 below:

FIGURE 4: ANOVA

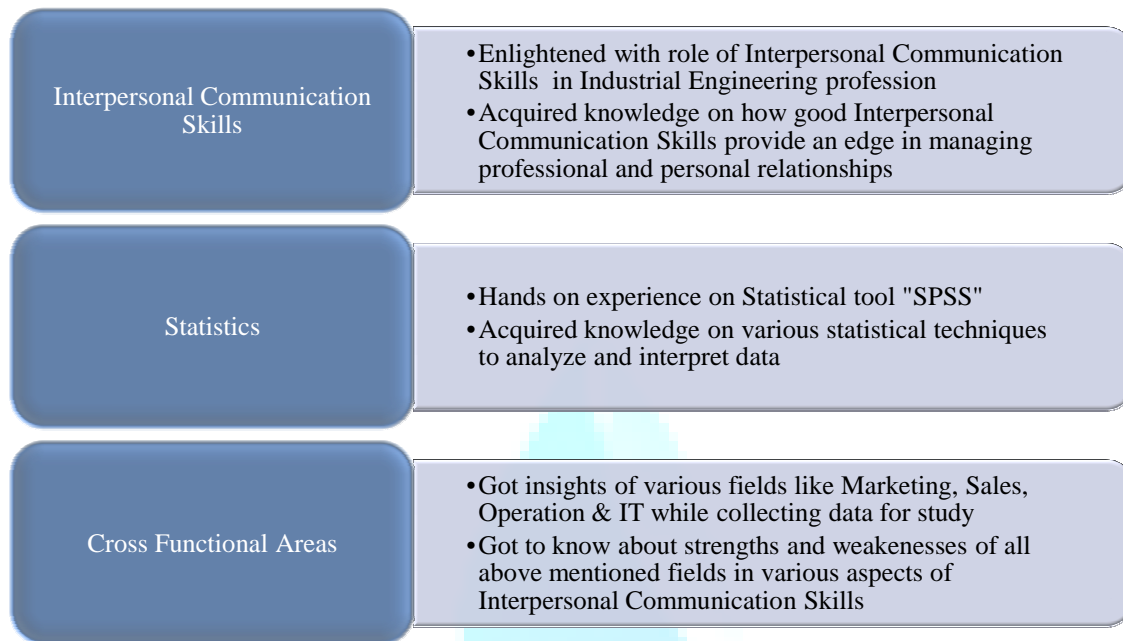
		Sum of Squares	df	Mean Square	F
INVOLVEMENT	Between Groups	4.239	3	1.413	1.665
	Within Groups	22.061	26	0.849	
	Total	26.3	29		
REFLECTION	Between Groups	1.559	3	0.52	0.514
	Within Groups	26.308	26	1.012	
	Total	27.867	29		
OPENNESS AND ADAPTABILITY	Between Groups	2.251	3	0.75	1.397
	Within Groups	13.963	26	0.537	
	Total	16.215	29		
ABILITY TO COMMUNICATE	Between Groups	2.862	3	0.954	1.141
	Within Groups	21.734	26	0.836	
	Total	24.596	29		

The value of *f* for Involvement, Reflection, Openness and Adaptability and Communicational Ability were found to be 1.665, 0.514, 1.397 and 1.141 respectively and is insignificant. Hence it is inferred that Interpersonal Communication skills does not affect the Industrial Engineers working in different sectors. However, it is because of inadequate sample size. Therefore, in future we shall repeat same studies with increased sample size.

7. FINDINGS

The learning from this case study covered various fields which are described below in figure 5:

FIGURE 5: FINDINGS



8. SCOPE FOR FUTURE RESEARCH

1. Interpersonal Communication Competence of Industrial Engineers can be studied in detail with more division in terms of gender, age and sector. Then these competences can be further compared to figure out which particular sector, age group, gender requires more attention towards improvement.
2. Study can bring better results if carried out on a large data set.

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APPENDIX

APPENDIX

Spitzberg & Cupach's Questionnaire consisting of 18 items is given below:

1. I want to adapt my communication behaviour to meet others' expectations.
2. I have enough knowledge and experiences to adapt to others' expectations.
3. I use a wide range of behaviours, including self-disclosure and wit, to adapt to others.
4. I want to be involved in the conversations I have with other people.
5. I know how to respond because I am perceptive and attentive to others' behaviours.
6. I show my involvement in conversation both nonverbally and verbally.
7. I want to make my conversations with others go smoothly.
8. I know how to change topics and control the tone of my conversations.
9. It is easy for me to manage conversations the way I want them to proceed.
10. I want to understand other people's viewpoints and emotions.
11. I know that empathy means to try to see it through their eyes and feel what they feel.
12. I show my understanding of others by reflecting their thoughts and feelings to them.
13. I am motivated to obtain the conversational goals I set for myself.
14. Once I set an interpersonal goal for myself, I know the steps to take to achieve it.
15. I successfully achieve my interpersonal goals.
16. I want to communicate with others in an appropriate manner.
17. I am aware of the rules that guide social behaviour.

18. I act in ways that meet situational demands for appropriateness.

It then finds out Interpersonal Communication Competence of Industrial Engineers through following parameters:

1. **Adaptability:** Examine your scores on items 1, 2, 3.
These scores reflect your ability to change behaviours and goals to meet the needs of the interaction, also known as "flexibility".
2. **Conversational Involvement:** Examine your scores on items 4, 5, 6.
These scores reflect your ability to become cognitively involved in the conversation and demonstrate involvement through interaction behaviours like head nods, vocal cues, etc.
3. **Conversational Management:** Examine your scores on items 7, 8, 9.
These scores reflect your ability to regulate conversation through controlling the topic, adjusting to a change in topic, interrupting, and asking questions.
4. **Empathy:** Examine your scores on items 10, 11, 12.
These scores reflect your ability to show your conversational partner that you understand his/her situation or that you share his/her emotional reactions to the situation.
5. **Effectiveness:** Examine your scores on items 13, 14, 15.
These scores reflect your ability to achieve the objectives you have for conversation.
6. **Appropriateness:** Examine your scores on items 16, 17, 18.
These scores reflect your ability to uphold the expectations for a given situation by behaving in ways other people expect of you. If you achieve your goals, but violate the expectations the other has for you and your relationship, then you are less than competent.

ADDITIONAL PARAMETERS

1. **Motivation:** It is desire to approach or avoid conversation and social situations. Your goals (what you want and with whom) motivate you to act. Your confidence or lack of confidence that you will be successful affects your motivation, as well.
2. **Knowledge:** It involves knowing how to act. Once you decide to pursue a conversational goal, you construct plans to obtain it. Previous experience and/or observing others inform your knowledge of what constitutes a workable plan.
3. **Skill:** It involves the behaviours actually performed. You might be motivated and knowledgeable about how to act in the particular situation, but lack some basic skills.

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