Skill Analysis of Production Managers Employed at Manufacturing of Branded Apparels

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Abstract: *Readymade garment industry is highly growth oriented industry. Exports in this are the largest foreign exchange earner for the country, accounting a good percentage of the total exports. Readymade garments has high demands as they are available in various prizes and ranges and India being having largest acreage under cotton cultivation and low labour cost is on an advantageous position. The benefits of training reflects in the figures on export sales and profitability, better motivated and skilled staff will provide a higher quality service to customers, develop existing markets, reduce customer complaints and related issues. The study of the research is focused to understand the skills level of Production managers working in national and International level of branded apparel manufacturing factories in Delhi and Nationalized Capital Region. This is an empirical study and the requirements are met by both primary and secondary data collection. The collected information is then analyzed to know the skill gap, further to propose with a training module.*

Index Terms: *Training, core skills, soft skills, apparel industry, garments, and production managers.*

I. INTRODUCTION

The garment industry is categorized by manufacturing firms of all sizes involved in the process of manufacturing of garments and making it available to its consumers of all groups, age and locations.

The majority of apparel produced and sold to mass customers is categorized as ready to wear or readymade garment. The industry which is involved in the designing and production of these garments is termed readymade garment industry.

The readymade garment industry in our country has made spectacular progress in the few decades. This business thrives in a situation of rising levels of incomes, particularly of the middle class and upper classes. In readymade garment business survival and progress depends on the capacity to adapt to changing fashions. The customer has become more and more fashion conscious, choosier, paying attention to price, quality, colour and stitching standards.

According to Industry Analyst, the major types of apparel suppliers can be grouped into the categories (Kurt Salmon Associates) as followed.

A. Conventional Manufacturers: they perform all functions of creating marketing and distributing an apparel line on a continual basis. These companies typically make products in their plants or factories but also might use outside companies to make their product. Manufacturers may produce brands of merchandise distributed nationally or regionally, licensed products or private label merchandise for a specific store.

B. Jobber: This name is given to companies that buy fabrics and acquire styles from independent designers or by copying or designing lines themselves, but use outside companies (contractors) to make their product.((Nancy o Bryant 2002, The Business of Fashion, fair child publication)

C. Contractors: these are the companies that specialize in the sewing and finishing of goods. Contractors are used by full function manufacturers who lack sufficient capacity in their own plants, by jobbers and by retailers for private label merchandise. According to the industry definition" contractors in the apparel industry are the small factories in which most apparels production takes place. Several different types of industry entities source apparel goods from contractors, including manufacturers, retailers, buyers, importers and trading companies".

Training is long term investment in human resources. Although there are direct effects on individual participants, the major impact of training is cumulative, and enterprises should not seek results over a short period. The key element in the notion of training is of flexibility and that flexibility must be seen in terms of a number of factors; the content of training, its form, the use of various teaching/learning methods, the timing and location of the training. The key to the successful training is satisfying the particular needs of the trainees and the enterprises which employ them. To meet those identified needs, training institutions must be flexible as possible in the provision of training. It is important to consider the various options open and select the types of training which best fits the enterprise's particular need and constraints. Some skills, like negotiation, can be dealt with in workshop situations: other subjects for example information on documentation procedures, could be handled in a short course

It is important to consider the various options open and select the types of training which best fits the enterprise's particular need and constraints. Some skills, like negotiation, can be dealt with in workshop situations: other subjects for example information on documentation procedures, could be handled in a short course

(Dr. Jatinder S Bedi, 2009) The numbers of units involved in wearing apparel are estimated at 17.55 lakh. Significant percentages (45.2 per cent) of such units are running without the aid of power. OAME (Own account manufacturing enterprise) units account for 14.68 lakh and the share of units running without power among OAME units is 48.6 per cent. The turnover of wearing apparel units for both factory and non-factory sector units is estimated at Rs 65060 crore.

In Garments sector, the study mainly focuses on units run commercially both for woven and Knitted units. In the present sample survey, seven major woven garment clusters namely Okhla (Delhi), Noida (Uttar Pradesh), Bangalore (Karnataka), Ahmedabad (Gujarat), Mumbai (Maharashtra), Jabalpur (Madhya Pradesh), and Madurai (Tamilnadu) are covered. Among these, Noida, Okhla and Bangalore have more export oriented units than other clusters.

Quality of garment varies across different clusters and depends upon the quality of fabric and accessories used. Generally, in the same cluster there is homogeneity in the type of products made, through quality differ widely across units. It is observed that productivity per machine in knitted garment unit is much higher than in woven garment units. Most of the units were found to be working on job work basis.

(Dr. Jatinder S Bedi, 2009) Total investment (here Gross Fixed Capital formation) made in the factory sector of the industry during the period 1992-93 to 2005-06 was Rs.93102 crore. Out of this, Rs. 40532 crore were invested during 1992-93 to 1998-99 and investment to the tune of Rs. 52570 crore were made during 1999-00 to 2005-061. Thus investments during the post-TUFS period much higher compared to pre-TUFS period. Total investments in the factory sector of the industry during 2005-06 was Rs. 14714 crore. Further, there has been significant

shift in the composition of investment and it has got more diversified in the latter period.

The facts and figures for Indian Exports of Apparel & Textile define: (Indian Apparel and Textile Industry, Report)

- Exports increased from US$ 14 million (2004-05) to US$ 17 million (2005-06) – 21.77 % increase.
- With continuing growth, the total exports has increased to – US$ 19.62 billion (2006-07).
- Current share in world export of textiles – 3.5 - 4 %.
- Current share in world clothing export – 3 %.
- Major export market – Europe (22% share in textiles & 43% share in apparel).
- Single largest buyer – US (10% share in textiles and 32.65 share in apparel).
- Other major export markets include - UAE, Saudi Arabia, Canada, Bangladesh, China, Turkey and Japan.
- Largest export segment – Readymade Garments (45% share in textile exports and 8.25 share in India's total exports).
- Readymade garments sector has benefited significantly with the termination of Multi-Fiber Arrangement (MFA in January 2005.
- Exports of readymade garments are expected to touch US$ 14.5 billion with a cumulative annual growth rate of 18-20% (Apparel export Promotion Council).
- Sector-wise Analysis indicated as in table depicts the figures for readymade garment industry.

II. LITERATURE REVIEW

The fashion business is composed of numerous industries all working to keep consumers of fashion satisfied. A special relation exists among these industries that make the fashion business different from other businesses. The four different levels of the fashion business known as the primary level, the retail level, the secondary level, and the auxiliary level. (Elaine Stone1999). The primary level is composed of the growers and producers of raw materials of fashion like fiber, fabric, leather and fur producers who function in the raw material market.

The majority of apparel produced and sold to mass customers is categorized as ready to wear or readymade garment. The industry which is involved in the designing and production of these garments is termed readymade garment industry.

Research starts with understanding consumer market trends done through market research. Market research can be defined as “the systematic and objective approach to the development and provision of information for the marketing management decision making process” (Kinnear & Taylor, 1983, p, 16). Market Research is divided in two general categories: Basic research that deals with extending knowledge about the marketing systems; applied research that helps managers make better decisions (Kinnear & Tayloret.al).

(Gavin Waddell, 2005) The mass production process includes production, sizing, and design strategies in mass production, lines within a design house, offshore production, ethical trading and new trends.

(Maurice J. Johnson, Evelyn C. Moore, 2001), the actual production of garments is a little like a football game. The production manager leads a team of people, each with different skills, whose job is to complete production within the allotted time. There is no

overtime; the retailer can legitimately cancel an order id it isn't delivered on time. This means that the whole team loses. Each member, the production manager, quality controller, buyer finder, patternmaker, grader, marker maker, spreader, cuter, bundler, operator, final quality checker, packer, and person involved in shipping and delivery, makes a critical contribution. (Maurice J. Johnson, Evelyn C. Moore, 2001) the actual production of garments is a little like a football game. The production manager leads a team of people, each with different skills, whose job is to complete production within the allotted time.

ATDC (Apparel Training and design Centers) have been set up through AEPC (Apparel Export Promotion Council) to cater the objectives of future needs of trained work force of the apparel manufacturing industry. Therefore 15% of the units hired work force trained from ATDC. Another 15% of the work forces were the degree or diploma holders from various other institutes like NIFT, home science colleges etc. and take up the profiles like merchandisers, designers etc.

Trained staff responds well to new responsibilities and they approach to job with enthusiasm as they have to apply skills and knowledge they have acquired. Enterprise is benefited by lower absenteeism, lower labour turnover, higher production levels and more motivated staff.

The benefits of a learning-by-doing approach to employee training have been recognized for years. Such program typically involves training in soft skills, i.e. skills such as listening, communication, teamwork, leadership, etc. Most of these 'soft' skills are not at all considered in the present curricula, and disciplines and major reorientation programs are required to enable graduates to practice effective facilitation of participatory processes (Moyo & Hagmann, 2000).In general, supervisors get slightly less training from employers than managers. Pine, Judith, Tingley, Judith C. 1993 researched on the evaluation of soft skill training. They found that the results of "soft-skills" training - in subjects such as problem solving, Team building, communication, listening and stress management - are notoriously difficult to measure. Soft-skills trainers seldom attempt evaluations designed to calculate return on investment (ROI). (Patrick Maclagan, 1994) understood the importance of 'business and management ethics' in the recent years. There were doubts about the feasibility and relevance of the subject which led to the skeptical, even cynical, reactions. Clarification was offered to remove some common misconceptions. Gordon, Jack. 1991 The most convenient way yet devised to determine the goodness of a job-related training program was outlined in 1959 by training consultant Donald L.
Kirkpatrick. Kirkpatrick proposed that there were 4 main levels at which the quality of a training course can be gauged.
At level one, trainees' reactions to the course were measured.
At level 2, learning was measured. Depending on the course objectives, this could involve anything from a pencil-and-paper test to a simulation or a full-fledged skill demonstration.
At level 3, the trainees are tested to see if they are using their new skills and knowledge back on the job.
At level 4, the company's return on investment is measured.

(Keith Bedingham, 1997)Discussed the importance of proving the effectiveness of training.
Effectiveness is the primary motive for training. It describes ways to evaluate training's effectiveness, behavior changes on the job being the most important. Defines an approach, whereby individuals can see how they have changed and quantify the amount of change. Training can be a useful tool in helping to resolve significant organizational or management problems. Management often recognizes that training in technical skills delivers real benefits, but blanch at the thought that training in non-technical areas can also be of great value.

III. OBJECTIVES AND METHODOLOGY

Relatively less studies has been done to find the need of types of skills requirements. In order to map this gap a research is required in this area to portray an outlay of the necessary and effective skills for Indian brands to compete with International brands manufacturing performances.

1. To develop a scale for the measurements of skills level in apparel manufacturing industry.
2. To gather information of existing skills sets required performing various functions at shop floor in the manufacturing units of Indian Brand and International Brands.
3. To study the required skills sets.
4. To compare the existing skills at national and international brands manufacturing engaged workers.

IV. ANALYSIS AND CONCLUSION

Data is suitable for factor analysis; Principal Components Analysis (PCA) was employed for extracting the data, which lets determining the factor underlying the relationship between numbers of variables. In order to 'extract' factors from the data, components that have an eigenvalue of 1 or more have to be identified from the Total Variance Explained extracted using Principle Component Analysis (Pallant, 2007). This determines the number of factors extracted from the data (Kaiser, 1960). The scree plot is an alternative method of identifying the number of factors to extract via factor analysis (Cattell, 1966) as it displays the sharpest drop in the eigenvalues of the factors, which highlights that further factors would not explain a significant amount of the variance of scale items. As displayed in Principle Component Analysis of this research data identifies that the first four components have recorded eigen values above 1.

Table

Communalities

	Initial	Extraction
Production and Processing - Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.	1.000	.517
Administration and Management - Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources	1.000	.696
Mathematics - Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications	1.000	.727

Mechanical - Knowledge of machines and tools, including their designs, uses, repair, and maintenance.	1.000	.640
Customer and Personal Service - Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction	1.000	.715
Personnel and Human Resources - Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems	1.000	.762
Education and Training - Knowledge of principles and methods for curriculum and Merchandiser design, teaching and instruction for individuals and groups, and the measurement of Merchandiser effects	1.000	.721
Clerical - Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology	1.000	.765
Public Safety and Security - Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions	1.000	.696
Computers and Electronics - Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming	1.000	.693
Design - Knowledge of design techniques, tools, and principle involved in production of precision technical plans, blueprints, drawings, and models	1.000	.801
Critical Thinking - Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	1.000	.778
Time Management - Managing one's own time and the time of others	1.000	.804
Active Listening - Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times	1.000	.662
Speaking - Talking to others to convey information effectively	1.000	.687
Reading Comprehension - Understanding written sentences and paragraphs in work related documents.	1.000	.807

Coordination - Adjusting actions in relation to others' actions.	1.000	.881
Management of Personnel Resources - Motivating, developing, and directing people as they work, identifying the best people for the job.	1.000	.836
Judgment and Decision Making - Considering the relative costs and benefits of potential actions to choose the most appropriate one	1.000	.597
Monitoring - Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action	1.000	.702
Social Perceptiveness - Being aware of others' reactions and understanding why they react as they do	1.000	.741
Complex Problem Solving - Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions	1.000	.651
Persuasion - Persuading others to change their minds or behaviour	1.000	.885
Negotiation - Bringing others together and trying to reconcile differences	1.000	.411
Instructing - Teaching others how to do something	1.000	.787
Writing - Communicating effectively in writing as appropriate for the needs of the audience	1.000	.693
Service Orientation - Actively looking for ways to help people	1.000	.806
Quality Control Analysis - Conducting tests and inspections of products, services, or processes to evaluate quality or performance	1.000	.739
Operations Analysis - Analysing needs and product requirements to create a design.	1.000	.839
Operation Monitoring - Watching gauges, dials, or other indicators to make sure a machine is working properly	1.000	.802
Systems Analysis - Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes	1.000	.810
Systems Evaluation - Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.	1.000	.833

Active Learning - Understanding the implications of new information for both current and future problem-solving and decision-making	1.000	.791
Learning Strategies - Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things	1.000	.727

Extraction Method: Principal Component Analysis.

Loading on factors can be positive or negative. A negative loading indicates that this variable has an inverse relationship with the rest of the factors. The higher the loading the more important is the factor. However (Comrey, 1973: 1346) suggested that anything above 0.44 could be considered salient, with increased loading becoming more vital in determining the factor. All the loadings in the research are positive

There are only four factors, each having Eigen value exceeding 1 for Skills of Production Managers. The Eigen values for four factors were 15.045, 4.174, 2.126and1.845respectively. The percentage of total variance is used as an index to determine how well the total factor solution accounts for what the variables together represent. The index for present solution accounts for 70.27% of the total variations for of end users. It is pretty good extraction as it can be economize on the number of factors (from 33 it has reduced to 4 factors) while we have lost 29.73% information content for factors for e-HRM. The percentage of variance explained by factor one to four for factors for Skills of Production Managers is26.464, 22.656, 13.170 and 7.983respectively. It means 70% of the variance of variable 1 is being captured by the four extracted factors together. The proportion of variance in any one of the original variables, which is being captured by the extracted factor, is known as communality (Nargundkar, 2002).

The Components Matrix is the output of the Exploratory Factor Analysis process that lists the loadings of each of the scale items on each of the four components. Valid components having scale item loadings of 0.5 and above (Hair et al. 2010) and scale items with the highest loading on that component (Wixom and Todd, 2005). This Components Matrix is subsequently rotated using Varimax Rotation to assist interpretation of its results (Malhotra, 2007), displaying only loadings of 0.5 and above.

Large commonalities indicate that a large number of variance has been accounted for by the factor solution. Varimax rotated factor analytic results for factor Skills of Production Managers. The four factors shown in rotation table have been derived from Rotation.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Service Orientation - Actively looking for ways to help people	.785				

Coordination - Adjusting actions in relation to others' actions.	.771					
Management of Personnel Resources - Motivating, developing, and directing people as they work, identifying the best people for the job.	.762					
Social Perceptiveness - Being aware of others' reactions and understanding why they react as they do	.752					
Instructing - Teaching others how to do something	.746					
Persuasion - Persuading others to change their minds or behavior	.738					
Complex Problem Solving - Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions	.700					
Design - Knowledge of design techniques, tools, and principle involved in production of precision technical plans, blueprints, drawings, and models	.688					
Negotiation - Bringing others together and trying to reconcile differences						
Operations Analysis - Analysing needs and product requirements to create a design.		.870				
Operation Monitoring - Watching gauges, dials, or other indicators to make sure a machine is working properly		.868				
Systems Evaluation - Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.		.866				
Active Learning - Understanding the implications of new information for both current and future problem-solving and decision-making		.820				
Systems Analysis - Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes		.815				
Learning Strategies - Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things		.802				
Quality Control Analysis - Conducting tests and inspections of products, services, or processes to evaluate quality or performance		.763				
Production and Processing - Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.		.555				

Reading Comprehension - Understanding written sentences and paragraphs in work related documents.		.883			
Active Listening - Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times		.773			
Mechanical - Knowledge of machines and tools, including their designs, uses, repair, and maintenance.		.769			
Monitoring - Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action		.742			
Speaking - Talking to others to convey information effectively		.740			
Writing - Communicating effectively in writing as appropriate for the needs of the audience		.729			
Judgment and Decision Making - Considering the relative costs and benefits of potential actions to choose the most appropriate one		.609			
Clerical - Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology			.821		
Mathematics - Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications			.763		
Personnel and Human Resources - Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labour relations and negotiation, and personnel information systems			.743		
Education and Training - Knowledge of principles and methods for curriculum and Merchandiser design, teaching and instruction for individuals and groups, and the measurement of Merchandiser effects			.741		
Public Safety and Security - Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions			.737		
Time Management - Managing one's own time and the time of others			.705		
Critical Thinking - Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	.507		.652		

Customer and Personal Service - Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction					.758
Administration and Management - Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modelling, leadership technique, production methods, and coordination of people and resources					.752
Computers and Electronics - Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming					.661

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Interpretation of Factors

Each factor needs to be assigned a name or label to characterize it and aid its interpretation (Tabachnick and Fidell, 2007). Each of the Skills of Production Managers that have been extracted via Principle Component Analysis in the Exploratory Factor Analysis process of this research data is displayed.

1. Administrative Skills

The first factor with the highest Total Variance Explained value has been interpreted as *Administrative Skills* due to its inclusion of scale items identified and adapted from academic literature surrounding Skills of Production Managers *Administrative Skills* , as displayed in table below

Service Orientation - Actively looking for ways to help people	.785
Coordination - Adjusting actions in relation to others' actions.	.771
Management of Personnel Resources - Motivating, developing, and directing people as they work, identifying the best people for the job.	.762
Social Perceptiveness - Being aware of others' reactions and understanding why they react as they do	.752
Instructing - Teaching others how to do something	.746
Persuasion - Persuading others to change their minds or behavior	.738
Complex Problem Solving - Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions	.700
Design - Knowledge of design techniques, tools, and principle involved in production of precision technical plans, blueprints, drawings, and models	.688

The scale items that load onto the Factor 1 are related to the *Administrative skills*

2. Operational Efficiency

The second factor with the highest Total Variance Explained value has been interpreted as *operational efficiency* due to its inclusion of scale items identified and adapted from academic literature surrounding Skills of Production Managers *operational efficiency*, as displayed in table below

Operations Analysis - Analyzing needs and product requirements to create a design.	.870
Operation Monitoring - Watching gauges, dials, or other indicators to make sure a machine is working properly	.868
Systems Evaluation - Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.	.866
Active Learning - Understanding the implications of new information for both current and future problem-solving and decision-making	.820
Systems Analysis - Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes	.815
Learning Strategies - Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things	.802
Quality Control Analysis - Conducting tests and inspections of products, services, or processes to evaluate quality or performance	.763
Production and Processing - Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.	.555

The scale items that load onto the Factor 2 are related to the following for *operational efficiency*

3. Personnel skills

The third factor with the highest Total Variance Explained value has been interpreted as *Personnel skills due* to its inclusion of scale items identified and adapted from academic literature surrounding Skills of Production Managers Personnel skills, as displayed in table below

Reading Comprehension - Understanding written sentences and paragraphs in work related documents.	.883
Active Listening - Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times	.773
Mechanical - Knowledge of machines and tools, including their designs, uses, repair, and maintenance.	.769
Monitoring - Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action	.742

Speaking - Talking to others to convey information effectively	.740
Writing - Communicating effectively in writing as appropriate for the needs of the audience	.729
Judgment and Decision Making - Considering the relative costs and benefits of potential actions to choose the most appropriate one	.609

The scale items that load onto the Factor 3 are related to the following for Personnel skills

4. Analytical Skill:

The fourth factor with the highest Total Variance Explained value has been interpreted as *Analytical skills due* to its inclusion of scale items identified and adapted from academic literature surrounding Skills of Production Managers is constraints, as displayed in table below

Clerical - Knowledge of administrative and clerical procedures and systems such as word processing, managing files and records, stenography and transcription, designing forms, and other office procedures and terminology	.821
Mathematics - Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications	.763
Personnel and Human Resources - Knowledge of principles and procedures for personnel recruitment, selection, training, compensation and benefits, labor relations and negotiation, and personnel information systems	.743
Education and Training - Knowledge of principles and methods for curriculum and Merchandiser design, teaching and instruction for individuals and groups, and the measurement of Merchandiser effects	.741
Public Safety and Security - Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions	.737
Time Management - Managing one's own time and the time of others	.705
Critical Thinking - Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	.652

The scale items that load onto the Factor 4 are related to the following for Analytical Skills.

5. Technical Skills:

The fourth factor with the highest Total Variance Explained value has been interpreted as *Technical skills due* to its inclusion of scale items identified and adapted from academic literature surrounding is constraints, as displayed in table below

Customer and Personal Service - Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction	.758
Administration and Management - Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources	.752
Computers and Electronics - Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming	.661

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