

## Development of a Decision Support System (DSS) Model Predicating on the procedures of Simple Additive Weighting (SAW) Method to recruit production Managers in garments companies by analyzing CV; Implications of a Fuzzy Method in Bangladeshi Garments Industry Context

AL JAIED CHOWDHURY & SUHEDA AKTER RIYA

### Abstract

Developing a Decision Support System (DSS) model based on the procedures of the Simple Additive Weighting (SAW) method for recruiting production managers in Bangladeshi Garments Companies is the main purpose of this study. A total of 11 parameters were developed and selected from the extensive literature review and structured interview for our preamble DSS model and they are- Level of education, age, work experience, project management skills, level of technical skills, Communication skills, Academic and professional, team skills, leadership skills, projection schedule and cost management skills, health and safety guidelines. Based on these 11 criteria or parameters, the resume of the applicants will be evaluated to rank the best alternative. In our Proposed DSS model, the analysis of the collected data excerpt from the CV starts by setting standard criteria ( $C_i$ ), creating and normalizing a decision matrix based on  $C_i$ , and ends with the final calculation of the best alternative ( $A_i$ ) from the addition of multiplications of a normalized matrix ( $R$ ) with the weight vector. To demonstrate the processing of our proposed DSS model, preliminary testing of a dataset consisting of three applicants of a hypothetical company (Chowdhury and Kabir Garment Limited) was run and found that the first applicant got 1st rank with the highest value of 27.29 whereas the third applicant got 2nd rank with the second-highest value of 26.61 while the second applicant got 3rd rank with the third highest value of 25.34, which implies that the first applicant is very much eligible for production manager positions.



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## 1.0 Introduction

Decision Support System (DSS) refers to a computer-aided system that helps to collect, analyze, and synthesize data to produce meaningful information furthering the facilitation of decision-making (Chela et al. 2022; Zhai et al., 2020). As a matter of fact, DSS is becoming extremely complicated in the last two decades because of the availability of alternative feasible solutions stemming from growing technological and communication systems, and the increased level of structural complexities (Phillips-Wren and Adya, 2020). Using perfectly processed information and facts from users with the help of an optimum model can cost-effectively entail robust automated decisions with fewer human errors through a particular decision support system (Juneja, 2018). Business organizations are always in need of skilled and talented employees to continue daily operations and it is very critical to get employees that meet the organization's respective assessment criteria, especially in the production management area of a garments company. Because a production manager has to perform complex responsibilities such as team alignment, managing deadlines as well as ensuring organizational commitments. Bangladeshi garment companies are facing difficulties in getting eligible candidates for production manager positions having the capacity to solve the aforesaid complexities. A huge load of job applications for a particular production manager position and the requirements of having multiple skills and qualifications make it much more difficult to choose eligible candidates within a limited time duration. Consequently, there is always a demand for a DSS model for recruiting eligible candidates for production manager positions in Bangladeshi Garments companies. To facilitate production manager hiring as well as to reduce human errors in evaluating prospective candidates, we are proposing a DSS model constructed based on the procedures of a popular Fuzzy Model- Simple Additive Weighting (SAW) method based on the criteria developed from the scrutinisation of pertinent literature as well as a structured interview of Two experienced HR professionals and also Three experienced production managers. Choosing prospective candidates for the production manager position requires analyzing multi-criteria or multi-attributes which also strengthens the logic of using the Simple Additive Weighting (SAW) Method as Kasap et al. (2020) stated that the SAW method determines the weighting of each criterion, and based on a systematic calculation, this method presents the ranked results of each subject based on the weighted analysis of the selected multi-criteria. Based on the division of selected criteria into two types- benefits and costs, *the* SAW method helps to evaluate the alternatives to reach a logical conclusion.

## 2.0 Literature Review

### 2.1 Decision Support System (DSS)

A Decision Support System (DSS) refers to an adaptive computer-based information system that involves using the extensive database, insights of the users, and different conceptual and theoretical models to entail specific decisions for solving a particular problem by predicting the input data (Hamoud et al. 2021). This system involves handling a large amount of data obtained from internal and external data sources, and processing them with mainframe systems to produce decisions, and present the results in both graphical and textual information thereby making it a sophisticated computing system (Cresswell et al. 2020). DSS starts with framing a particular problem to create a model for further solving future alike problems. Juneja (2018) defined DSS as an informational application by gainsaying that this type of information system deals with providing information to users for enhancing better decision-making efforts as opposed to the operational application (merely providing recordings of business transactions).

DSS is mainly used for coming up with decisions that are considered low frequency in terms of numbers but high potential consequences in terms of impact (Keenan & Jankowski, 2019). Kasap et al. (2020) claimed DSS is an interactive user-friendly model that is created based on an iterative process that facilitates taking multiple and interdependent decisions in semi-structured and unstructured situations. However, DSS is also vulnerable to different types of algorithmic biases (*Training data bias, Human Bias, Automation bias*) that entails biased decisions increasing the probability of making false decisions that can also entail a huge loss for the organization (Yun et al., 2021). Though DSS automates monotonal or routine decision-making and saves the timing of managers, it substantially also reduces the subjective decision-making capacities of managers which may result in a higher probability of making false decisions (Yun et al., 2021). Despite its limitations, Comprehensive usages of DSS to rectify decision-making efforts are extensive in the field of the health sector, RMCG sector, Military Sector, and FMCG sectors.

## **2.2 Types of Fuzzy Method**

A Fuzzy Method is a mathematical way of representing data that are ambiguous and lacking in certainty, and this type of information can be identified, depict, modify, interpret, and use through a Fuzzy Method (Ducange, et, al. 2020). Fuzzy logic and fuzzy set theories are used in Fuzzy Methods. Fuzzy Methods are used to deal with the uncertainty of everyday lives. Simple Additive Weighting (SAW) and the Weighted average method are two common types of Fuzzy Methods.

### **2.2.1 SAW method**

Simple weighted average method works by dealing with the circumstances of decision-making (Tamba, 2021). Finding the best options among the potential alternatives with certain criteria is the purpose of this method. The benefit of the method is that it can be adjusted for several variables. Kraujalienė (2019) highlighted that the method of measuring the model is simple and tools or computer program is required. Besides, this method can calculate the differences between alternatives which makes it easier for the decision-makers to make decisions. However, Tamba (2021) identified that the results gathered using the SAW method are not logical always, SAW method is used if all the values are maximized and emphasize maximizing those further, but the wide differences between variables can lead to negative transformation. Consequently, the results gathered using SAW method may not always logical.

### **2.2.2 Weighted Average Method**

The weighted average method is the sum of a group of numbers, each of which has a distinct "weight" or value (Bragg & Bragg, 2022). Otani and Yadohisa (2020) stated that Weighted average method is used over the traditional average method because in the traditional average method the distinct weight of different variables is ignored thus the outcomes acquired from the method are not accurate to some extent. It's considered one of the most scientific and practical method of determining the costs and benefits of a particular thing. Besides, as it takes less time in determining costs, prompt decisions can be made to take advantage of the opportunities. However, rigid assumptions can lead to wrong decisions by the decision-makers. Moreover, acquiring the current cost of the project from the market is difficult, and wrong information may affect the entire outcome and manipulate the decision (Fahmi, et, al. 2020).

### 2.3 Overview of the usages of DSS models in the Recruitment Process

With the advancement of technological innovation in the recruitment field, it becomes very much easier to recruit possible candidates within the shortest possible time. With the complexity of the requirement and difficulties in finding out the specialized people for specialized positions, it is getting difficult for recruiters to scan the best possible candidates without being influenced by any kind of biases and also within the shortest possible time. However, to solve these issues, a lot of DSS models have been introduced in the recruitment field.

A data-driven appointment and recruitment system (DARS) was developed by Olusola Olajide et al. (2014) in such a way that it reduces the hassles of appointment scheduling and final recruitment decisions about the candidates. This DARS model provides a matching design between the demand of employers and the qualifications of the candidates. In this model, appointees are required to book appointments from thereceptionists within a bounded time and need to wait in the queue. The appointment of candidates is occurred automatically through this DARS model by matching the staff's stored appointment data with the appointee option. As stated by Olajide et al. (2014), this application is developed by using PHP, MySQL database as well as a scripting language.

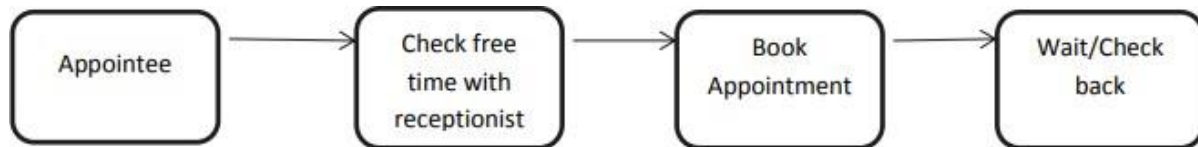


Figure-02: A data-driven appointment and recruitment system Model (Olusola Olajide et al. 2014)

Najjar et al. (2021) developed a DSS model called I-Recruiter that helps to rank candidates by predicating the analysis of their resume and matching with the job descriptors' requirements. This model functions based on three blocks: 1) Training block-where this model is trained on different training data set; 2) Matching Block: used for matching the resumes to the corresponding description of the job requirement; 3) Extracting block: responsible for coming up with the best possible candidates.

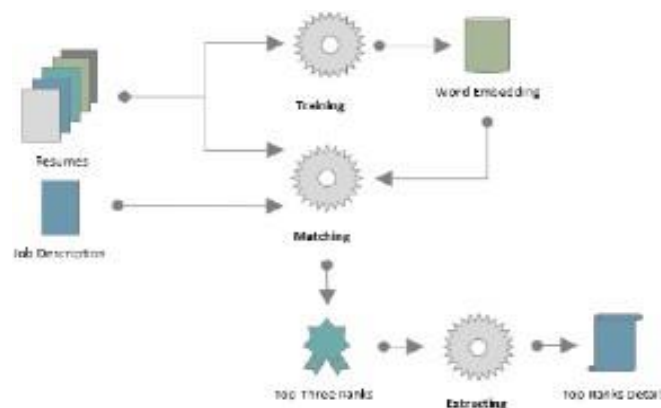


Figure-03: I-Recruiter DSS Model (Najjar et, al. 2021)

Vijaymeena & K, Kavitha. (2016) came up with a proposed prototype of a resume ranking and recommendation system called Smart Applicant Ranker which functions primarily by

establishing linkages between the candidate models and the jobrequirement model. Like the model developed by Najjar et al. (2021), This resumeranking model- Smart Applicant Ranker also work based on three modules- *information extraction, candidate search, and candidate ranking algorithms*. The information extraction model retrieves relevant required information from resumes while the candidate search module shows high-ranked resumes after calculating the similarity scores of the attributes stemming from the resume with the job requirement information. And then, nominated candidates are finally selected predicting the results from two algorithms- Educational credentials and skills as well as work experiences (Vijaymeena & K, Kavitha, 2016).

## 2.4 Readymade Garment sector in Bangladesh

The readymade garment sector in Bangladesh has enriched the economy of Bangladesh by acting as a substance for the development of Bangladesh. After the war of 1971, when Bangladesh was struggling with poverty and no major industry was built due to the lack of resources, the Garments industry contributed to rebuilding the economy of Bangladesh. After the collapse of the jute industry, it was RMG that balanced the export earnings of Bangladesh. In 2020, Bangladesh nearly made \$41.2 billion from export which the RMG sector alone contributed 83% of the total export earnings (Islam, 2021). It has risen from 3.89% in the fiscal year 1983-1984 to 83% in the current years. The RMG sector was established by Nurool Quader Khan who had a vision of transforming the country into a developing country from the poorest country in the year 1978 (BGMEA, 2020). 130 Employees were sent to South Korea to learn about readymade garments who further worked in the first RMG factory in Bangladesh named “Desh”. At that time, with Desh, many others RMG companies such as Bond Garment, Reaz Garment, Paris garment, and Ajim garment were established by other prominent businessmen which further motivated and directed the entire garment industry of Bangladesh (BGMEA, 2020). According to statics by Statista, in 2019 the numbers of RMG factories were 4.62 thousand. These companies have established the biggest workplace in the country. Around 4.22 million people are involved in the garments industry (Mia and Akter, 2019). RMG industry has empowered women more than any other industry in Bangladesh. The ratio of workers of male and female workers is 41:59 (Ganbold, 2022). Along with a large number of Bangladeshi workers, a significant number of workers from various countries work in those garments too. Thus the RMG industry of Bangladesh has been enriched with diverse workers. Low labor cost has encouraged foreign investors to invest in Bangladesh in vast amount; each year the company is growing. The annual growth rate of the industry in 2019 was 7% (Mia and Akter, 2019).

## 3.0 Methodology

Simple Additive Weight (SAW) is a multi-criteria or attributed-based weighted simulation concept that helps to rate different alternatives to reach a logical conclusion (Tamba, 2021). Kraujalienė (2019) said that SAW is primarily used to solve those problems which predicate on multiple situation basis criteria. Based upon the findings of the number of weighted performance ratings for each alternative on the selected attributes, the SAW method normalizes the decision matrix (X) to a particular scale that can be compared with all of the ratings of existing alternatives.

### 3.1 Selecting criteria or parameters for the DSS Model

#### 3.1.1 Criteria from Literature Review

To determine the criteria for evaluating the CV or resume of the applicants for the position of a production manager, we have collected 25 articles of which only 15 articles were selected finally based on the relevance to our aim of this study. A descriptive statistics of the chosen articles based on the criteria is presented as follows:

Criteria	Taxonomy of the articles	Frequency (Percentage)
Education	(Briggs, 2011) (Boahin & Hofman, 2013) (Aring, 2012)	20%
Work Experience in the production field	(Khare & Varma, 2016) (Islam, 2022)	13%
Technical Skills	(Tonidandel et al., 2012) (Husain et al., 2010) (Patwary, 2015)	20%
Academic and professional achievement	(Boahin & Hofman, 2013) (Bridgstock, 2009)	13%
Knowledge of Projection schedule and Cost Management	(Islam & Islam, 2018) (Hossain, et, al. 2012)	13%
Health and Safety guidelines	(Guo, et, al. 2007)	6%
communication	(Tewari and Sharma, 2011) (Chan, 2006)	13%

#### 3.1.2 Criteria selected from the findings of the interview

We have conducted a structured interview with five HR Professionals and production managers working in the different fields of the renowned garment companies of Bangladesh to find out which criteria can be best for generating the best outcome for our DSS model built on the main theme of SAW method. The findings of the interview are presented as follows:

##### 3.1.2.1 Demographic Information

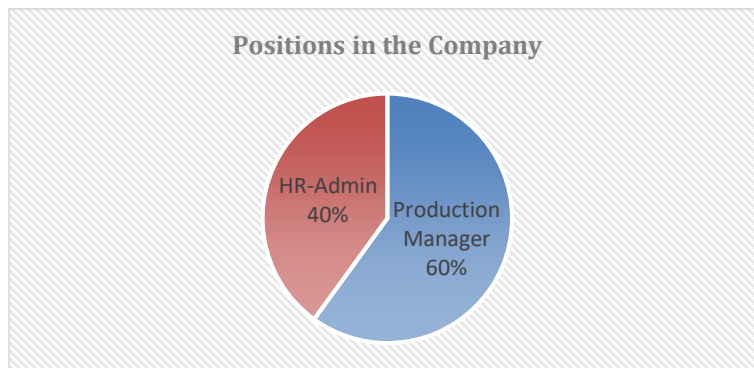


Figure-04: Information about the positions of the respondents in the company (Source: Authors)

Three of our total interviewees have been serving as the production managers of different renowned garments companies and two of them are also working as the HR admin of two prominent garments in Bangladesh.

### 3.1.2.2 Interview findings

**Question-01: What do you think, which project management skills are necessary for production managers to be efficient in managing production?**

*Respondent-01: "Well, I think Planning and Forecasting should be complementary skills for product managers, as production managers need to deal with the materials needed to complete production"*

*Respondent-05: "I would say Budgeting and risk management should be the must-have skills"*

From the interview findings, it came into being that *planning and forecasting, risk and budgeting* should be the project management skills possessed by a project manager to efficiently manage flawless production in the organization.

**Question-02: What do you think which team working skills would help a production manager in ensuring flawless communication among team members?**

*Respondent-02: "To me, it's supportive behavior because I can get along with the managers who are supportive and warm rather than with the ones who are always disappointed"*

*Respondent-03: "Delegation makes employees think they are capable and feel empowered from within and this reduces awkwardness or fear of the managers, so I think production managers should be delegated, this will increase the efficiency of their subordinates"*

To sum up, the interviewee (HR Professionals) thinks that a production manager should possess supportive behavior towards their colleagues and subordinates, and also possessing the behavior of delegation can also make the transfer of responsibility from one person to another with ease.

**Question-03: If you were to be a leader which skill will you master for taking strategic decisions, motivating employees, and being creative in product planning?**

*Respondent-04: "No, I don't think these roles can be played with a particular skill; I would need a bundle of skills such as Strategic thinking skills, creativity, and inspiring mentality."*

*Respondent-01: "As a manager, I would like to be empathetic and flexible towards my subordinates, these can motivate them I can say, besides, I would say I should master the skill of thinking strategically"*

From the interview findings, it is found that Strategic thinking skills, creativity, and inspiring mentality, being empathetic and flexible are the skills a production manager should master for making good strategic decisions.

### 3.3 Selecting and weighting each criterion

The first criterion is the education level of the candidates which is very much critical to success in the respective field as it enables a person to indulge himself in the critical thinking and self-evaluation process (Nourani et al., 2021).

Criteria-01: Education

Level of Education (Cr1)	Weight (w)
Preliminary Education	1
High School Education	2
Higher Education	3
PhD	4
PGD Diploma	5

The next criterion is the age limit of the candidates. This criterion determines the experience level and indicates the mentality of being assiduous in the workplace the candidates.

Criteria-02: Age

Age Limit (Cr2)	Weight (w)
20-29	1
30-39	2
40-49	3

The third criterion is about the work experience of the candidates in the production field. It implies that the candidate is aware of the requirement of the employers and workplace cultures of the organizations in the related field.

Criteria-03: Work Experience in the production field

Work Experience (Cr3)	Weight (w)
0-1 year	1
1-3 year	2
3-5 year	3
5-above	4
No experience/ Newbie	5

The fourth criterion will help the recruiters to get information about the current technical skills of the candidates creating an indication that whether the company has to invest a lot or not in the training and development activities of the candidates in the future. Because Candidates with high technical skills generate high productivity and also don't require high training and development aid.

Criteria-04: Technical Skills

Level of Technical Skills (Cr4)	Weight (w)
Low	1
Medium	2
High	3

The next criterion is project management skills. The Project Management Skills ensure that the production manager can create better production planning, control production processes, manage production deficit as well as can also quantify successes (Pourmand et al.,



2021). Pourmand et al. (2021) also averred that it will also help production managers to ensure better collaborations among departments.

Criteria-05: Project Management Skills

Level of Project Management Skills (Cr5)	Weight (w)
Planning and Forecasting	1
Budgeting and Tracking	2
Meeting facilitation	3
Budgeting	4
Risk Management	5

The Sixth criterion of this SAW Method is about evaluating communication skills. This skill is one kind of obligatory skill for a production manager as s/he has to maintain multiple communication with the suppliers of the raw materials, senior managers, purchase department as well as with the employees of his or her department.

Criteria-06: Communication Skills

Level of Communication Skills (Cr6)	Weight (w)
Poor	1
Moderate	2
Good	3
Very Good	4

The next criterion is an academic and professional achievement. This criterion is selected because it will give the idea about how good is the candidate in his or her academic and previous professional life and also indicates his or her expertise in the respective field through his or her achievements.

Criteria-07: Academic and professional achievement

Level of Academic and professional achievement (Cr7)	Weight (w)
Poor	1
Moderate	2
Good	3
Very Good	4

The eighth criterion is about the team working skills. As a production manager has to run a big team, s/he must have some specific skills that can ensure flawless communication among team members as well as a positive work environment.

Criteria-08: Team working Skills

Level of Team working Skills (Cr8)	Weight (w)
Delegation	1
Efficiency	2
Supportive behavior	3
Ideas	4

The ninth criterion is about leadership skills. This criterion will describe the current capacity of the candidate as a leader to take strategic decisions, motivate employees as well creative in product planning.

## Criteria-09: Leadership Skills

The tenth criterion of our SAW method is the project scheduling and cost management capacities.

<b>Leadership and Interpersonal Skills (Cr9)</b>	<b>Weight (w)</b>
Strategic thinking skills	1
Empathy	2
Inspiring mentality	3
Creativity and flexibility	4

This will help a project manager to determine the timelines and resources required to complete a project within a dictated time. And the cost management skills will also enable the production manager to reduce excessive costs stemming from poor equipment management, low-quality raw materials as well as excessive investment in the purchasing of equipment (Singh Dubey et al., 2021).

## Criteria-10: Knowledge of Projection schedule and Cost Management

<b>Knowledge of projection schedule and cost management (Cr10)</b>	<b>Weight (w)</b>
Satisfied	1
Very Satisfied	2
Moderate	3
Dissatisfied	4
Very Dissatisfied	5

This criterion of this SAW method is about the health and safety guidelines. This criterion will ensure that the prospective candidates have the knowledge about the necessary health and safety guidelines that will enhance the safety of the employees and workers in the production house.

## Criteria-11: Health and Safety guidelines

<b>Health and Safety Guidelines (Cr11)</b>	<b>Weight (w)</b>
Satisfied	1
Very Satisfied	2
Moderate	3
Dissatisfied	4
Very Dissatisfied	5

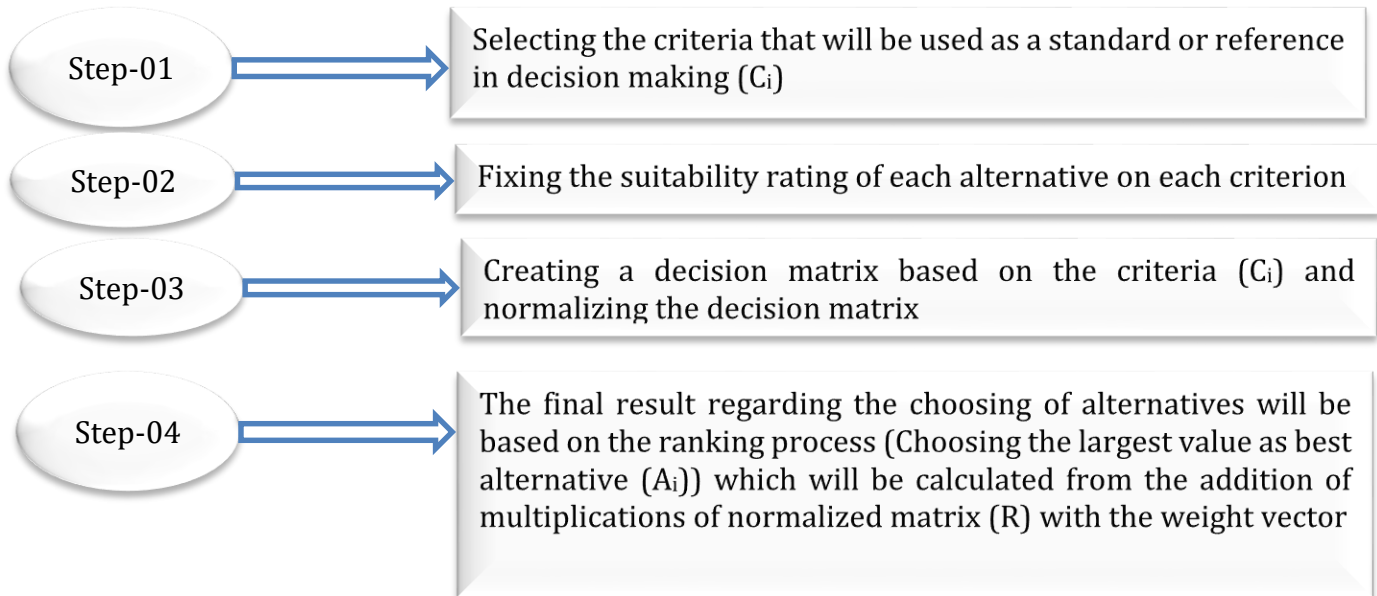
From the review of the literature and the interview findings, we have been able to identify a total of 11 criteria that will be used to select the best alternative candidates for the production manager positions. But all of these criteria are not similar, some of them can be considered as the profit for the organization (beneficial to the alternative) and some of them can be considered as a cost for the organization (detrimental to the alternative).

The details of these criteria and weight are given below:

<b>Criteria</b>	<b>Name of the criteria</b>	<b>Weight</b>	<b>Type</b>
C1	Level of Education	4	Benefit
C2	Age	3	Cost
C3	Work Experience	4	benefit
C4	Level of Technical Skills	3	Benefit
C5	Project Management Skills	2	Benefit
C6	Communication Skills	3	Benefit
C7	Academic and professional achievement	4	Cost
C8	Team working skills	3	Benefit

C9	Leadership Skills	3	Benefit
C10	Knowledge of projection schedule and Cost management	2	Benefit
C11	Health and Safety Guidelines	2	Benefit

### 3.4 Steps of Simple Additive Weight (SAW) Method



### 3.5 Formula that will be used to calculate the normalization matrix

These two formulas will be used to calculate the normalization matrix in this SAW method to come up with the best alternative candidates:

**The formula for the benefit attribute:**

$$r_{ij} = \left[ \frac{X_{ij}}{\text{Maximum}(ij)} \right]$$

**The formula for the cost attribute:**

$$r_{ij} = \left[ \frac{\text{Minimum}(X_{ij})}{X_{ij}} \right]$$

Here,

$r_{ij}$  = Normalized performance rating

Max = Maximum value of Row and Column

Min = Minimum value of row and column

$I_j$  = Row and column in the matrix

**The formula for determining the preference value of each alternative ( $V_i$ ):**

$$V_i = \sum_{j=1}^n w_i r_{ij}$$

Here,

$V_i$  = The final score of alternative

$W_i$  = Predefined weight

$r_{ij}$  = Normalized Matrix

## 4.0 Results and Discussions

### 4.1 The Way Simple Additive Weight (SAW) Method in the Proposed DSS model

In this section, how the Simple Additive Weight (SAW) method will work in our proposed Decision Support System (DSS) Model will be described through a hypothetical case situation:

Three alternative candidates namely Applicant-01, Applicant-02, and Applicant-03 applied for the position of production manager positions in a company called Chowdhury & Kabir Garments Limited, and through our developed DSS model predicting the SAW method will show a result to choose the best alternative candidates for the production manager positions:

Applicants	Cr1	Cr2	Cr3	Cr4	Cr5	Cr6	Cr7	Cr8	Cr9	Cr10	Cr11
Applicant-01	Higher education	30-39	1-3 years	Medium	Planning & Forecasting ; Budgeting	Poor	Good	Efficiency	Empathy	Dissatisfied	Satisfied
Applicant-02	Preliminary education	20-29	No experience	Low	Budgeting	Good	Moderate	Ideas	Empathy	Moderate	Moderate
Applicant-03	PhD	40-49	5-above years	High	Budgeting & Tracking	Good	Good	Supportive Behavior	Strategic thinking	Very satisfied	Very satisfied

Figure-05: Matching the rating under each criterion

### Step-01: Determining the standard weight (W) for each criterion:

In our developed DSS model, every organization will have the scope of customized rating options in the standard weight stage because as Kraujalienė (2019) highlighted that the importance of skills or requirements for selecting a production manager depends on the various factors like- organizational culture, Organization's mission, vision, and objectives. And the decision or policy makers should also arrange or set the standard weighting for each criterion based on the current situations of productions or demands of the products of their organizations.

Criterion	Cr1	Cr2	Cr3	Cr4	Cr5	Cr6	Cr7	Cr8	Cr9	Cr10	Cr11
Rating	4	3	4	3	2	3	4	3	3	2	2

**Step-02: Creating the decision matrix (JR) for further calculation**

$$JR = \begin{bmatrix} 3 & 2 & 2 & 2 & 1 & 1 & 3 & 2 & 2 & 4 & 1 \\ 1 & 1 & 5 & 1 & 4 & 3 & 2 & 4 & 2 & 3 & 3 \\ 4 & 3 & 3 & 3 & 2 & 3 & 3 & 3 & 1 & 2 & 2 \end{bmatrix}$$

**Step-03: Normalizing the decision matrix by using the below formula:**

$$r_{ij} = \left\{ \frac{x_{ij}}{\text{Max}_{ij}} \right\} \text{ dan } r_{ij} = \left\{ \frac{\text{Min}_{ij}}{x_{ij}} \right\}$$

$$r_{11} = \frac{\text{Minimum}\{3,1,4\}}{3} = \frac{1}{3} = 0.33$$

$$\Gamma_{15} = \frac{\text{Minimum}\{1,4,2\}}{1} = \frac{1}{1} = 1$$

$$r_{21} = \frac{\text{Minimum}\{3,1,4\}}{1} = \frac{1}{1} = 1$$

$$\Gamma_{25} = \frac{\text{Minimum}\{1,4,2\}}{4} = \frac{1}{4} = 0.25$$

$$r_{31} = \frac{\text{Minimum}\{3,1,4\}}{4} = \frac{1}{4} = 0.25$$

$$\Gamma_{35} = \frac{\text{Minimum}\{1,4,2\}}{2} = \frac{1}{2} = 0.50$$

$$r_{12} = \frac{2}{\text{Maximum}\{2,1,3\}} = \frac{2}{3} = 0.67$$

$$\Gamma_{16} = \frac{1}{\text{Maximum}\{1,3,3\}} = \frac{1}{3} = 0.33$$

$$r_{22} = \frac{1}{\text{Maximum}\{2,1,3\}} = \frac{1}{3} = 0.33$$

$$\Gamma_{26} = \frac{3}{\text{Maximum}\{1,3,3\}} = \frac{3}{3} = 1$$

$$r_{32} = \frac{3}{\text{Maximum}\{2,1,3\}} = \frac{3}{3} = 1$$

$$\Gamma_{36} = \frac{3}{\text{Maximum}\{1,3,3\}} = \frac{3}{3} = 1$$

$$r_{32} = \frac{3}{\text{Maximum}\{2,1,3\}} = \frac{3}{3} = 1$$

$$r_{13} = \frac{\text{Minimum}\{2,5,3\}}{2} = \frac{2}{3} = 0.67$$

$$\Gamma_{17} = \frac{\text{Minimum}\{3,2,3\}}{3} = \frac{2}{3} = 0.67$$

$$r_{23} = \frac{\text{Minimum}\{2,5,3\}}{5} = \frac{2}{5} = 0.40$$

$$\Gamma_{27} = \frac{\text{Minimum}\{3,2,3\}}{2} = \frac{2}{2} = 1$$

$$r_{34} = \frac{3}{\text{Maximum}\{2,1,3\}} = \frac{3}{3} = 1$$

$$\Gamma_{37} = \frac{\text{Minimum}\{3,2,3\}}{3} = \frac{2}{3} = 0.67$$

$$\Gamma_{18} = \frac{2}{\text{Maximum}\{2,4,3\}} = \frac{2}{4} = 0.50$$

$$\begin{aligned}
 r_{28} &= \frac{4}{\text{Maximum}\{2,4,3\}} = \frac{4}{4} = 1 & r_{210} &= \frac{3}{\text{Maximum}\{4,3,2\}} = \frac{3}{4} = 0.75 \\
 r_{38} &= \frac{3}{\text{Maximum}\{2,4,3\}} = \frac{3}{4} = 0.75 & r_{310} &= \frac{2}{\text{Maximum}\{4,3,2\}} = \frac{2}{4} = 0.5 \\
 r_{19} &= \frac{\text{Minimum}\{2,2,1\}}{2} = \frac{1}{2} = 0.50 & r_{111} &= \frac{\text{Minimum}\{1,3,2\}}{1} = \frac{1}{4} = 0.25 \\
 r_{29} &= \frac{\text{Minimum}\{2,2,1\}}{2} = \frac{1}{2} = 0.50 & r_{211} &= \frac{\text{Minimum}\{1,3,2\}}{3} = \frac{1}{3} = 0.33 \\
 r_{39} &= \frac{\text{Minimum}\{2,2,1\}}{1} = \frac{1}{1} = 1 & r_{311} &= \frac{\text{Minimum}\{1,3,2\}}{2} = \frac{1}{2} = 0.50 \\
 r_{110} &= \frac{4}{\text{Maximum}\{4,3,2\}} = \frac{4}{4} = 1 & & 
 \end{aligned}$$

**Step-04: Results of the normalized performance rating value (r<sub>ij</sub>):**

$$r_{ij} = \begin{pmatrix} 0.33 & 0.67 & 0.67 & 0.67 & 1 & 0.33 & 0.67 & 2 & 0.50 & 1 & 0.25 \\ 1 & 0.33 & 0.40 & 0.33 & 0.25 & 1 & 1 & 1 & 0.50 & 0.75 & 0.33 \\ 0.25 & 1 & 0.67 & 1 & 0.50 & 1 & 0.67 & 0.75 & 1 & 2 & 0.50 \end{pmatrix}$$

**Step-05: Calculation of the preference value (Row Elements of normalized Matrix\*Preference weight corresponding to the matrix column elements W):**

Applicant-01= 4(0.33) + 3(0.67) + 4(0.67) + 3(0.67) + 2(1) + 3(0.33) + 4(0.67) + 3(2) + 3(0.50) + 2(1) + 2(0.25) = 1.32+2.01+2.68+2.01+2+0.99+2.68+6+1.5+2+4.1= 27.29

Applicant-02=4(1) + 3(0.33) + 4(0.40) + 3(0.33) + 2(0.25) + 3(1) + 4(1) + 3(1) + 3(0.50) + 2(0.75) + 2(0.33) = 4+0.99+1.6+0.99+4.1+3+4+3+1.5+1.5+0.66= 25.34

Applicant-03= 4(0.25) + 3(1) + 4(0.67) + 3(1) + 2(0.50) + 3(1) + 4(0.67) + 3(0.75) + 3(1) + 2(2) + 2(0.50) = 1+3+2.68+3+1+3+2.68+ 2.25+3+4+1= 26.61

**Step-06: Ranking of the Result:**

RANK	APPLICANT	VALUE
1	Applicant-01	27.29
2	Applicant-03	26.61
3	Applicant-02	25.34

From the above table regarding the ranking of applicants, it came into being that Applicant number-01 has the highest value (27.29) thus resulted in the ranked-01, consecutively applicant number-03 has the second-highest value (26.61) thus resulted in the ranked-02 and in the same way, applicant number-02 has the third highest value (25.34) thus resulted in the ranked-03. The hypothetical company (Chowdhury & Kabir Garments Limited) can choose applicant-01 as the best possible candidate for the production manager position.

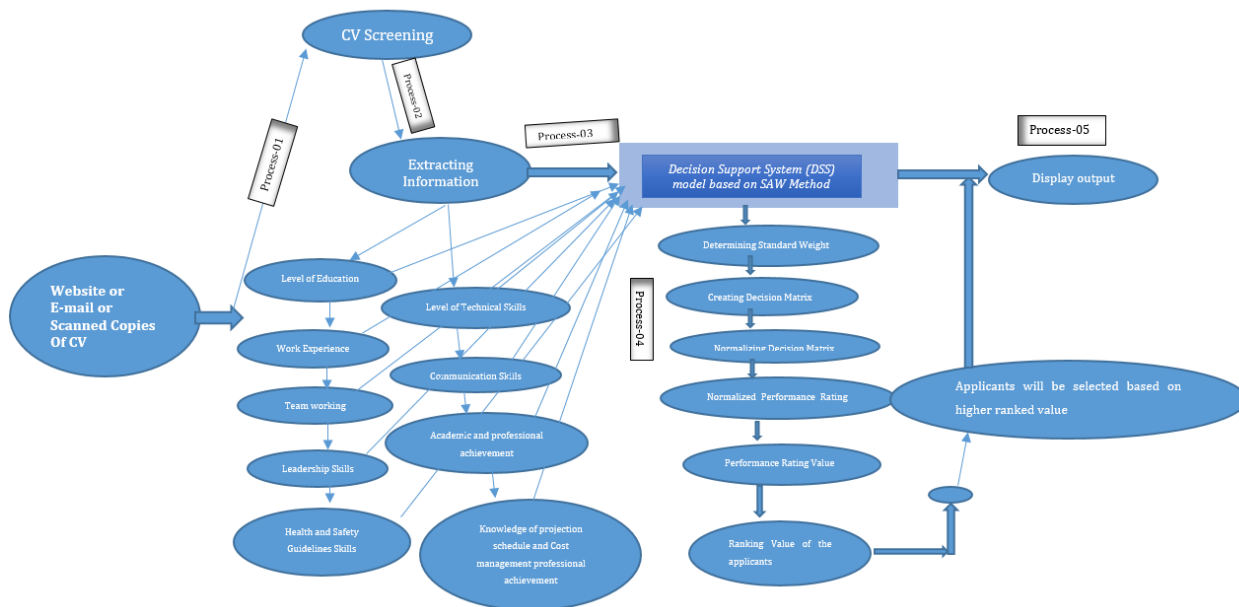
**4.2 Proposed Model**

Figure-06: Proposed DSS model predicating on the SAW Method (Source: Authors)

In our proposed DSS model constructed based on Simple Additive Weighting (SAW), The process of evaluating applicants for production manager positions will start from receiving CVs through company websites, e-mails, or hand-to-hand submission in the office. Then in the first process-CV screening, only the information about our selected criteria (Total Elevens Criteria excerpt from literature review and our interview findings from HR professionals and product managers working in the different garments organization of Bangladesh) will be excerpt by individual applicant basis. Then the excerpt information of each applicant will be inputted in our proposed DSS model where a ranked result (through a particular algorithmic model created by following the steps of the SAW Method) of each applicant will be evaluated and the applicants will be chosen predicating on their ranked value.

## 5.0 Conclusions

To conclude, it can be said that there is precedent of similar types of DSS models have been developed before but in the context of Bangladeshi Garments industry, we did not find any DSS model which can help to hire production managers by analyzing CV. The strongest part of our DSS model is that it works based on Multi-Criteria system and all the criteria used in this model have been developed by taking interview of five experienced HR Professionals and production managers as well as by reviewing the literatures defining the skills and criteria for a particular production manager in the context of Bangladesh; thereby increasing the accuracy level of our proposed DSS model if used properly in Garments Company. Therefore, having criteria developed in the context of local Bangladeshi Garments industry context for recruiting production managers is the differentiating point of this study with the existing studies. These eleventh criteria based DSS model has been tested with the data of three applicants of a hypothetical company (Chowdhury & Kabir Garments Limited) to show how this model works and we have found that the first applicant got 1<sup>st</sup> rank with the higher value of 27.29 whereas the third applicant got 2<sup>nd</sup> rank with the second-highest value of 26.61 while the second applicant got 3<sup>rd</sup> rank with the third highest value of 25.34 which implies that the first applicant is very much eligible for production manager position. The selected criteria were developed and selected in the context of the Bangladeshi garments industry and based on different situations, companies can bring changes to the criteria we have proposed in our DSS model.

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## Appendix

*Question 1: In which area of production you are currently working in?*

*Question 2: How much technical skills are needed for this field?*

Question 3: What do you think, which project management skills are necessary for production managers to be efficient in managing production?

Question 4: How much Level of Communication Skills is needed for maintaining communication with suppliers and managers?

Question 5: How much Level of Academic and professional achievement is needed for maintaining communication with suppliers and managers?

Question 6: What do you think which team working skills would help a production manager in ensuring flawless communication among team members?

Question 7: If you were to be a leader which skill will you master for taking strategic decisions, motivating employees, and being creative in product planning?

Question 8: Knowledge of Projection schedule and Cost Management aids project manager in determining the timelines and resources required to complete a project within a dictated time.

Question 9: Health and Safety guidelines ensure the necessary health and safety guidelines knowledge of prospective candidates.

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