FORECASTING WORKFORCE FOR STORE ATTENDANTS IN A GROCERY RETAILER

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Abstract: Through the years, automation and computerization change the way of doing business, meanwhile the needs for successful workforce management remains as a key role being sustainable for the companies. In the grocery retailers, where are low margins due to hard competition and many players, the companies search for the new methodologies increased due to decrease the costs and have better efficiency results. In the sector, there are mainly three expenses; workforce, rent and transportation. As in most of grocery retailing organizations workforce is the biggest asset and expenditure in the company, the ability to predict workforce needs is an important research issue and achieving the best configuration for the workforce (time, demand and the cost) can provide a fabulous competitive advantage. Therefore, there is a business imperative to understand, measure, manage and plan for it properly. Achieving match between available and required workforce helps ensure the rhythm of working processes and desired company results. For this purpose, companies can use different tools and specific models for forecasting their workforce needs. Hence, in the grocery retailer stores there are many job description and responsibilities; the different workforce requirement algorithms for each job is a necessity. In the literature, there are many studies on workforce requirements for the cashiers, where is the job description clear and there are more repetitive tasks compare to store attendants. Cashiers have wider opportunity for the data analysis and interpretation. The Store Attendant's job description is complex and there are more independent variables, while performing the work. Therefore, there are less research about workforce need of a Store Attendant in the literature. This is precisely the purpose of this report to provide a brief account of the essential aspects of the workforce need of store attendants, to justify the need to reconcile the available and necessary workforce and to formulate some advantages/benefits to predict and forecast the needs of workforce. In the project, the store attendants' workforce requirement methodology in the Turkey's biggest retail company has been examined and improved. The company's workforce management department and the store management helped to outline daily task of the job for determining guideline for the time studies. Afterwards, with the time study guideline, 20 different store attendants from 13 different stores with total shifts of 170 hours observed to have an idea about daily tasks and it's work load distribution during the day. Combinations of sales data analysis and empirical data obtained through time studies helped to output a new way of workforce determination algorithm forecasting any given 30 minutes period for a day. Thus, knowing the workforce requirements for each 30 minutes periods, gives the company advantages to plan flexible shifts hours rather than constant 8:30 shifts. The usage of the algorithm leveraged the company in terms of better workforce demand forecast, utilizing employee costs and reduces waste usage of workforce.

Keywords: store attendant, workforce requirement, grocery retailer, time study.

1. PROJECT OBJECTIVE

In the companies, human resources department has checked and controlled the labor costs most of the time, however the need of workforce and its distribution to the departments of a store mostly decided by store managements. In grocery stores, the life is dynamic due to a rival company's competition nearby, municipal infrastructure change decisions, seasonal effects, location properties or even weather conditions of the area and many other independent variables. There has been a belief that, store management knows most of the variables, therefore they would know the best accurate need of the workforce requirement for the store. The success of the forecasting workforce requirement changes depends on the department as well. The Turkish retail company has a system for forecasting cashiers demands in a given time. However, they are using standard shift system (morning, noon and afternoon with 8:30 working hours) for other departments based on store management know-how and proposition.

The output of the project aims to help the company to develop an algorithm to forecast their workforce need for the store attendants. To do so, first a Store Attendant job description has been reviewed and based on the feedback from the store management and store attendants themselves, a guideline for the time study chart created. Time study measurements carried out for 20 different employees and the results examined. Sales data integrated with the time study observation results and new forecast algorithm has published.

2. JOB DESCRIPTION OF A STORE ATTENDANT, TIME STUDY GUIDELINE AND RESULTS

Store Attendant Job Responsibilities

- Receives incoming shipments of goods and materials. Unloads trucks and accepts items based on quality and condition;
- Determines minimum stock requirements; monitors inventory; reorders as necessary products to maintain stock at the minimum levels;
- Enters data into computerized inventory system and produces routine reports;
- Recognizes products that require special handling or storage (perishable, volatile, toxic,)'
- Stores goods in designated areas and shelves; rotates stock according to shelf life, expiration dates, lot numbers, out of stock situation;
- Gathers goods and materials from inventory locations/storage as specified by pick list or requisition. Secures items on pallet or other container for shipment;
- Reconciles quantities of collected goods and materials with requisition or pick list; transports to dock and loads truck;
- Print, check or control price tags of the product, takes necessary action upon request;
- May staff a customer service counter and respond to customer requests;
- To keep track of daily company news about campaign, having knowledge about specially priced products and prioritized applications;
- Informing the customer about current/seasonal campaign and making sure customer gets the benefits;
- Informing store management about customer' feedback.

Analyzing job responsibilities and getting feedback from store management and store attendants themselves, time study guideline and work structure breakdowns created. To analyze the current situation, time study method has been applied (Ernest, Jiang, Krishnamoorthy, & Sier, 2004; Talarico, & Duque, 2015; Institute of Management Services; Lın, Lai, & Hung, September 2000; Aldosary, 1999; Reilly, 2015; Mirrazavi, & Beringer, 2007; Menezes, Kim, & Huang, 2006). Institute of Management Services definition of time study is, a structured process of directly observing and measuring human work using a timing device to establish the time required for completion of the work by a qualified worker when working at a defined level of performance. Time study is a necessity in terms of to comprehend store attendant's job responsibilities and explore if there is anything might be missed from the data driven perspective. Therefore, time study measurements have been conducted in 13 different shops with 20 different employees on different days and shift hours.

Store Attendant Work Structure Breakdown for Time Study Guideline

A trial time study has been conducted in one store, afterwards with then feedbacks and observations the final guideline created with 18 different sub-work structure.

Terminologies and Abbreviations Used in the Guideline (see Table 1).

General Work Classification	Sub Work Structure
Tag Related Operations	TA: Tag Arrangement
	TP: Tag Printing
	TC: Tag Price Control
Goods Related Operations	O: Order New Goods
	GA: Goods Acceptance
	TG: Taking Goods from Storage/Shelves
	PG: Putting Goods to Shelves
	EDC: Expiration Date Control
Communication	BT: Business Talk
	CC: Customer Comminication
Arragement of Goods	SA: Shelves Arrangement
	AS: Arrangament of Storage
Break	B: Break
Idle	I: Idle
Multi-Task Operation	MT: Multi-Tasking
Carrying	C: Carrying
Walk	W: Walk
Other	Ot: Other

Table 1. Sub-Work Structure of a Store Attendant

(TA) Tag Arrangement: Changing price tags due movement of goods or promotion, discount;
(TP) Tag Printing: Printing new price tags due to new price or discount;
(TC) Tag Price Control: Checking price tags to be updated;

(O) Order New Goods: Ordering new goods according to inventory and forecast;
(GA) Goods Acceptance: Checking and accepting goods from the truck or delivery person;
(TG) Taking Goods from Storage/Shelves: Taking goods from the storage to bring the instore area;
(PG) Putting Goods to Shelves: Fulfilling the shelves with goods;
(EDC) Expiration Date Control: Checking goods in terms of expiration date.
 (BT) Business Talk: Time spent on work talking with management or colleagues;
(CC) Customer Communication: Talking with the customer about their needs;
(SA) Shelves Arrangement: Rearranging the shelves according to the left products, pulling the goods from the back of the shelves;
(AS) Arrangement of Storage: Arranging the storage for new coming/owned products;
(B) Break: The amount of time, a worker spends time on a tea break, lunch break or any other break type;
(I) Idle: Being idle during the process;
(MT) Multi-Task Operation: When a worker is operating out of his/her main job description, but helping store operations in the rush hours;
(C) Carrying: Moving goods from one place to another;
(W) Walk: Time spent on walk;
(Ot) Other: Undefined and rare occasion/action.

Time Study Guideline for Store Attendant																				
Date							16.02.2019													
Categories							Detergent, Legumes, Soap, Paper													
Store Name							Kozyatağı Supermarket													
NO	**Sub Work Structure**																			**Time (Second)**	**Starting Time**
0	W	C	TG	PG	SA	TC	EDC	TA	TP	O	GA	BT	CC	AS	MT	B	I	Ot		
1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	683	13:31:00
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	13:42:23
3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	24	13:43:47
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142	13:44:11
5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	23	13:46:33
6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187	13:46:56
7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	13:50:03
8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	13:50:56
9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	210	13:53:06
10	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	13:56:36
11	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	13:58:10
12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124	13:59:29

Table 2. Example of Time Study Guideline

Observation	Date	Store Type	Shifts			Days		
			Morning	Noon	Afternoon	Weekend	Weekday	Promotion
1	25.12.18	Discount	x			x		
2	12.01.19		x				x	
3	17.01.19			x				x
4	23.01.19			x			x	
5	23.02.19				x	x		
6	19.12.18	Small Supermarket	x			x		
7	19.01.19		x					x
8	30.01.19			x			x	
9	03.03.19				x		x	
10	06.03.19				x	x		
11	13.02.19	Supermarket	x					x
12	23.02.19			x			x	
13	28.02.19			x				x
14	08.03.19				x		x	
15	20.03.19				x	x		
16	07.01.19	Hypermarket	x			x		
17	16.02.19		x				x	
18	14.03.19			x				x
19	17.03.19				x		x	
20	25.03.19				x	x		

Table 3. Plan for Time Studies

The time study guideline with 20 observation (see Table 2 and Table 3) helped to understand the current system and the percentage of the task's distribution through a day. In Figure 1, all time studies are evaluated, and the percentage of each task over total workload has been calculated.
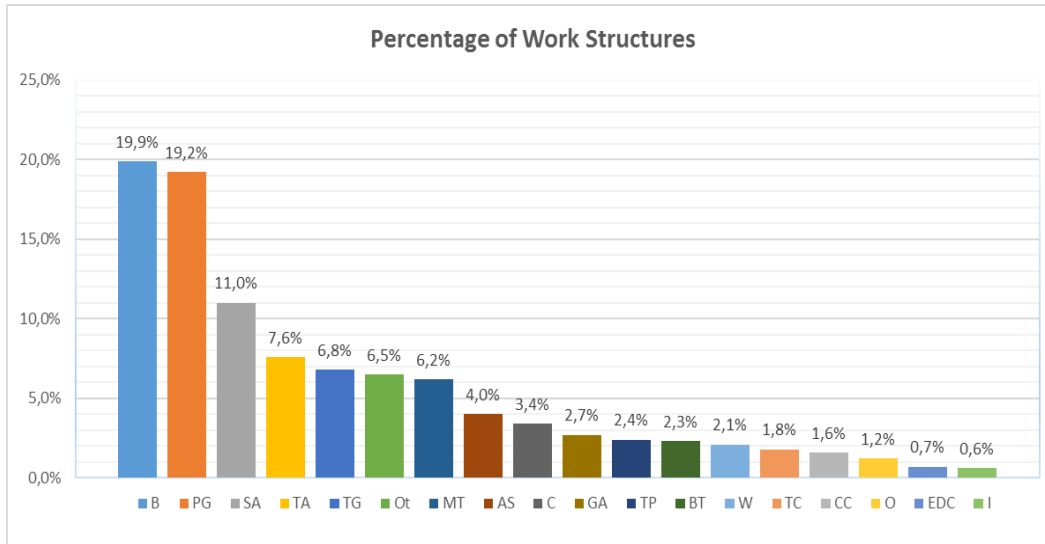

Figure 1. Percentage of Work Structures from 20 observations

3. ANALYSES OF SALES DATA

In the company, store attendants are responsible from dry grocery, tobacco&beverages, detergent&paper&cosmetics and non-grocery products categories. The past sales data of those categories examined for the number of products sold for each category in 30 minutes interval. Considering many independent variables and seasonal effect on the sales data Holt Winter's method used to forecast upcoming days intervals of 30 minutes for each category.

So far, the only purpose of the forecast was to calculate workforce demand for each period. Hence, sales data needs to be linked to the number of store attendant needed. To achieve this, time study results has been used. Based on the results of the time studies, the workload of each product sold in the store for a given time, obtained from mainly 7 different work structure, which are TG- Taking Goods from Storage/Shelves, C-Carrying, PG-Putting Goods to Shelves, SA-Shelves Arrangement, W-Walk, O-Order New Goods and GA-Goods Acceptance. According to this, the sum of the works required to replace a sold product from the shelves; constitutes 46,4% of the total time of a store attendant.

Time Period 26.04.2019	Categories	Forecasted # of Goods	Avg Time to Replenish a good (sec)	Total Time (sec)
18:00 - 18:30	Dry Food	67	9,7	649
	Tobacco&Beverages	27	8,4	227
	Detergent&Paper&Cosmetics	18	14,8	267
	Non-Food	42	7,8	328
Needed work time (%46,4)			1.470 (sec)	24 (min)
Estimated need work time (%100)			3.168 (sec)	53 (min)
Number of Store Attendant Needed			=53/30	2 employee

Table 4. Example of one period of required workforce in terms of time

As shown in the Table 4, the number of store attendant needed for 18:00-18:30 on 26th of April calculated by forecasted number of items multiplying by each category average replenishment time, which is given by the company based on a study covering more than 200.000 products replenishment time average. After finding 1.470 seconds of workforce needed to replenish the products, the total time expanded to %100, since from the observation only %46,4 of the work directly related to the sold product. Therefore, to cover 53 minutes workforce, 2 store attendants are needed between 18:00 – 18:30 time interval.

4. CONCLUSION
By establishing a workforce requirement algorithm, which linked workforce metrics to business outcomes helped grocery retailer benefiting of increase in manpower efficiency and lowering workforce costs. The literature, where do less researches compare to other jobs in grocery store, supported by having a different aspect of workforce determination algorithm for the store attendants.

The Turkish retailer company has been leveraged to be able to forecast workforce need for 30 minutes periods so that, with the help of algorithm the company can manage flexible working hours in scheduling. From point view of store management guessing the manpower needs, to the system-based forecast methodology with much more details helped to cut down unnecessary workforce usage in the company. For further studies each segment of a store can be examined in detail by itself, due to change of work structure percentages according to size and the sale of the stores.

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