THE ROLE OF TECHNOLOGICAL, ORGANIZATIONAL AND ENVIRONMENTAL FACTORS IN THE ADOPTION OF HALAL WAREHOUSING

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Abstract

It has been a rapidly emerging trend for companies to achieve a halal certification for their business processes. In this regard, halal warehousing plays a vital role in the company's halal certification process. Therefore, this research aimed to identify motivating factors for the organizations to implement halal warehousing in Pakistan's food manufacturing and supply industry. The data for this study is gathered from the supply chain professionals working in the Pakistani food industries—a total of 142 valid responses received through a structured questionnaire. Structural Equation Modelling (SEM) is used to analyze the data. This study reveals that all the variables of Technology, Organization, and Environment (TOE) have a significant impact on halal warehousing. In the organizational context, top management support plays an essential role in halal warehousing implementation. The findings of the study may assist halal food

manufacturing and raw material providers to implement halal warehousing in their businesses. Furthermore, governmental support for the implementation of halal warehousing is vital.

Keywords: *TOE, Warehousing, Halal Warehousing, Halal Supply Chain, Halal Standards.*

1. Introduction and Background of the Study

In today's knowledge economy, the questions of safety and integrity of Halal food have gained much more importance among Muslim consumers worldwide because of repeated incidents of Halal food contamination[1]. Such as the Plethora food crisis and spongiform encephalopathy, or mad cow disease, and the most recent horsemeat scandal in the United Kingdom are some of those incidents which revealed and raised concerns for Muslims concerning their food consumption[2] [3]. Most of the contaminations are linked with fraud, adulteration, and sometimes substituting the products to gain profit in the market[4].

According to the world population review of 2020[5], the global Muslim population has crossed the number of 1.9 billion, contributing to Halal products in the world trade. These Muslim consumers living in Muslim and Non-Muslims countries now raise questions about the Halal food genuineness and its integrity, especially the products imported from the Non-Muslim countries[6]. The word Halal is considered as law among Muslims, therefore Muslim consumers always remain very vigilant with respect to the consumption of Halal food[7]. However, most of those consumers consuming the Halal products are not aware of the Halal supply chain values, and they consume the product after looking at the Halal logo affixed on the packaging and trust the product based on the logo without any verification [8] [9]. However, if their trust is breached due to any flaw in the Halal food supply chain, it may lead to a significant loss in the brand value of a product or an organization. Therefore, increasing interest in the Halal supply chain process is found by many organizations worldwide in order to maintain their brand image in front of Muslim consumers. On top of it, Muslim consumers are susceptible to food integrity, food handling, and the control of food norms. Due to this compassion of consumers, Halal food integrity has become very difficult to design, manage and enhance[10].

1.1. Research Objective and Contributions

This study considers one of the neglected components of the Halal supply chain process, that is, Halal warehousing. Precisely, the purpose of the study is to apply TOE theory, which facilitates firms to adopt new technologies influenced by technological context,

organizational context, and environmental context, and determine the effects of technological, organizational, and environmental factors on Halal warehousing. The study attempts to answer how Halal manufacturing companies that deal with Halal edible products manage their inventories in the warehouses and secure their product from contaminations.

The contributions of this study are as follows: **First,** the full potential of research in the field of Halal supply chain is yet to be unfolded[11] [12]. Such companies are unwilling to adopt the Halal certification, mainly due to increasing extra efforts, which is also a demotivating factor for other enterprises not to opt for the Halal certification and the practices.[13]. **Second,** the existing literature contains many inconsistencies and misunderstandings regarding the concept of the Halal supply chain[14]. For the Halal supply chain process, it is imperative to be understood that Halal standards are not limited to the product's production process; instead, it can easily lose the status of Halal if it is mishandled during the storage process before reaching the customer[15]. The concept of Halal warehousing is relatively new as well as challenging for companies to adopt. According to the Halal supply chain service providers, companies are increasing to get the certification of Halal manufacturing[16]; however, the rate of adoption of Halal warehousing is meager. Nevertheless, it is complicated to understand why most Halal manufacturing companies are reluctant to confirm their activities to Halal warehousing[17].

Third, the academic literature available on the Halal supply chain has focused mainly on the process, ingredients, status, or management of the food products; in contrast, the area of Halal warehousing has received minimal attention[18]. Therefore, this study intends to contribute to the literature by focusing on the factors important towards the adoption of Halal warehousing. **Fourth,** although researchers have understood the importance and the vast market of Halal strategies for preserving Halal products, the available evidence shows that Halal strategies are not popular among the food manufacturing enterprises[19]. **Fifth,** this research is based on one of the largest Muslim population countries, Pakistan. For Muslims, it is a massive concern that consuming Halal is not only beneficial physically as well as spiritually; in fact, it is also binding on them by the law of the land to consume Halal[20]. Similarly, the organizations in such countries are bound by law to produce Halal products and maintain consumers' trust Halal[21]. Therefore, this research is an effort to check the importance of Halal warehousing regarding the TOE framework to contribute to the organizations to understand and learn the limitations of Halal warehousing and the suggestions from the practicing companies.

The study's findings briefly report that technology and organizational support do not play an essential role in the intention to adopt Halal warehousing. However, environmental factors have a significantly substantial impact on the companions to adopt Halal warehousing. The detailed findings will help the managers and the policymakers of organizations learn the internal and external factors of Halal warehousing and the motivating factors for the implementation of Halal warehousing. Government agencies and policymakers will also learn the problems that must be addressed to motivate Halal practices.

The rest of the paper is organized as follows: Next is section two, which comprises three parts. Part one outlines a brief process of the Halal supply chain, and part two contains theoretical underpinnings, and part three mentions hypotheses development. Section three include methodology, followed by results and conclusions in sections four and five, respectively.

2. Literature Review

2.1. Process of Halal Supply Chain

Organizations' main challenge is to understand the supply chain practices to gain operational and organizational performance[22]. Food won't be considered Halal if the food has not been stored or handled according to the Islamic principles, contributing to Halal integrity. Furthermore, the Halal and non-Halal products' packages and handling must be separated; if necessary, the Halal products' warehousing must be separated from the non-Halal products to prevent potential contamination of the Halal and the non-Halal products[23].

From raw material to the manufacturing and from procurement and handling of the equipment to the consumption point, if Islamic regulations are being followed that would be known as Halal operations[24]. The Halal supply chain process includes the complete production cycle[25], marketing of the product, and the channel through which the consumer is getting the product should also follow the Halal integrity[26]. Every person working in the supply chain from higher-order to the lower order must be monitored during the process to achieve the objective of unharmed and the Halal product, which will result in customer satisfaction[27].

Comparing Halal supply chain with conventional supply chain, same functional rules are followed by both the operations with some unique exceptions that must be followed during the processes of planning, implementing and controlling of the product with the specifications of the Islamic Guidelines in the Halal supply chain[28].

The primary purpose of the Halal Supply chain is to ensure the product to be Halal and Tayyib[29] (Tayyib means wholesomeness, which includes healthy, safe, quality and nutritious) from manufacturing to the consumption point. Even the equipment used for handling the Halal products, such as fork lifters used to carry the Halal meat, should not be used to lift the non-Halal food or any other item to prevent contamination[30].

Further, the companies must ensure strict compliance and do the due diligence concerning Halal warehousing [31] and Halal logistics [32] . It is a process-oriented method that needs close management and teamwork among the stakeholders to establish the supply chain's best performance, considered the Halal supply chain[33].

2.2. Theoretical background

In the 1990s, Tornatzky and Fischer developed a Technological, Organizational and Environmental (TOE) framework that facilitates firms to adopt new technologies influenced by technological context, organizational context, and environmental context. These three contexts are potential barriers and the opportunities to adopt innovation in a firm's business processes.[34] TOE framework is considered a reliable framework that contains the capability to be implemented in different cultural, technological, and national contexts. The framework has been adopted in various researches to express the inter-organizational systems. For this study to determine the factors affecting the adoption of Halal warehousing, the TOE framework is most suitable since it provides insights from internal organizational systems[35].

The Technological Context refers to the firms' external and internal technologies most relevant to the company. It depends on the type of technology the firm wants to adopt and choose the variable. This context includes the factors of Perceived Benefits and Compatibility[36]. Perceived benefits denote how new technology must have better benefits than the one still in use. Perceived benefits are regarded as providing predictable benefits to the company, which is the main reason an organization adopts new technologies.

The Organizational Context: it is denoted by the characteristics and the properties of the organization, which includes Top Management Support [37] , Organizational Readiness [38] , Understanding the Practices[39], Halal Awareness[40], Halal Integrity[41], Expected Business Benefits[42], and Entrepreneurial Intensity[43].

The top management has the authority to decide on the firm; hence, top management plays an essential role in the adoption of new technologies. To adopt the Halal services in the firm, organizational

readiness measures the capacity of management to adopt the new technology[44]. The players must understand the Halal practices in order to gain from the Halal strategies. Awareness is a necessary tool for the adoption of Halal innovation and communication technologies and their extension. Halal awareness is identified as a significant variable in the TOE framework that positively impacts Halal warehousing.

The Environmental Context refers to the firm's internal and external environment, including the size of a firm, competition, macroeconomic, and regulatory environment. Environmental factors mainly include Competitive Pressure[45], Consumer Pressure[46], and Halal Market Demand[47]. Competitive pressure refers to the competition between the two firms and the fear of losing the competitive benefit; this fear can make organizations adopt the new technological innovation. Customer pressure is considered the most valuable variable for innovation because it manages customer relationship management. Market demand is the primary reason for the adoption of any technology; increasing demand of Halal products worldwide is the primary reason behind the increasing demand of Halal warehousing and Halal logistics[48].

Halal warehousing is considered the operations of Halal services to separate Halal products from their counterparts and monitor the products not to contain, adulterated or mishandled by the carriers[49].

2.3. Hypothesis Development

2.3.1. Technological Context

Technological context refers to two kinds of technologies relevant to the organization. These technologies are being used in the company and technologies are not in the company's current use but available in the market and can be used in the future[50]. While perceived benefits are regarded as the important variable for the adoption of Halal warehousing, it is considered the best forecaster for adopting any new technology. It can provide benefits to the Halal manufacturers[51]. Further, compatibility is an essential variable for the adoption of Halal warehousing. Due to compatibility, a firm can measure the adoption as beneficial and aligned with the Halal specification, value system, and job responsibilities. In contrast, incompatibility is the barrier for the organization to adopt technologies[52], and it became the reason for losing the opportunities. Therefore, this study posits,

H1; Technology has a significant impact on the adoption of Halal warehousing.

2.3.2. Organizational context

For the adoption of new technology, organizational readiness shows the ability of company's operational management to adopt Halal warehousing. Top management support is an important tool because top management regularly pushes managers to bring new ideas and learn the organizational practices regarding the Islamic principles[53]. Halal integrity means total honesty towards the Halal concept during the whole production process[54]. Halal practices among the employees become the reason for the company's financial benefits and competitive performance. The organization must be aware of the availability of new technologies; if the firm fails to do so organization won't adopt the innovation [55] . Entrepreneurial intensity is the firm's level of determination towards the entrepreneurial activities demonstrated by the company. Based on these postulations, this study hypothesizes,

H2; Organizational context has a significant impact on adoption of Halal warehousing.

2.3.3. Environment context

Consumer pressure can be roughly explained as "customer is always right", which entails to make your customer loyal and satisfied towards your organization[56]. Further, the competitive pressure with other organizations in terms of innovation, price, technology etc., is inevitable and is essential for adopting innovation. In addition, the increasing demand for Halal products directly depends upon the customer's knowledge of the product. Multiple pieces of evidence have showed that Halal market demand competitive pressure and customer's pressure support the Halal practices, therefore,

H3; Environment has a significant impact on the adoption of Halal warehousing.

2.3.4. Conceptual framework

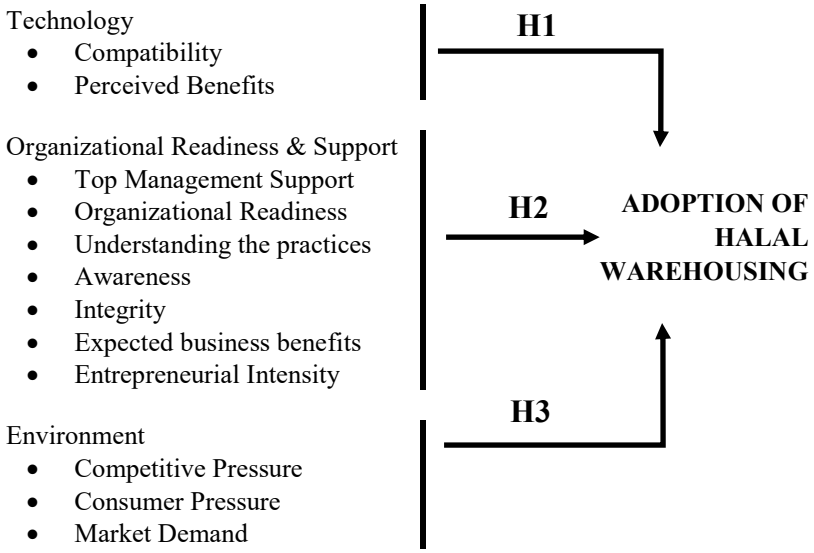

Figure 1 - Conceptual framework

3. Research Methodology

This study aims to determine the effects of TOE theory on the adoption of halal warehousing, and purpose is to find out the relationship of technological, organizational, and environmental variables on halal warehousing. Each variable has been observed keenly with the help of the survey questionnaire methods. An explanatory research method with the help of the Statistical tools data has been deployed to interpret the relationship among each construct. Sources of each item along with the complete items have been shown in the Table 1.

Variables	Item	Source
TECHNOLOGICAL CONTEXT		
Compatibility	1. My company is likely to adopt new innovation on the products and processes of Halal Standard. 2. Business and process of my company has aligned to Halal Standard. 3. The new procedure related to Halal Standard is suitable with my company's existing practices.	(Ngah *et al*., 2014a; Tan *et al*., 2012)
Perceived benefits	1. By implementing Halal Standard, we feel that our production control will improve.	(Ngah *et al*., 2014b;

	2. By adopting Halal Standard, we feel that market share will increase. 3. By adopting Halal Standard, we feel that quality of the product will improve	Tan *et al*., 2012)
ORGANIZATIONAL CONTEXT		
Top Management Support	1. Our top management is likely to be interested in adopting the Halal Standard in order to gain competitive advantage. 2. Our top management would like to invest some budget to support and implement Halal Standard. 3. We feel that our top management is really concerned on the importance of implementing Halal standard.	(Fernando *et al*., 2015; Ngah *et al*., 2014b)
Organizational readiness	1. Our employee has understood the Halal Standard. 2. Our company understands the real situation of the business related to Halal Standard. 3. Our company is ready to re-align companies' policies and strategy in order to implement Halal Standards.	(Ngah *et al*., 2010)
Understanding the practices	1. Our company fully understands the circular of Halal Standard. 2. Our company is ready for new policies and practices related to implementation of the Halal Standard. 3. Our company understands the legal aspects to ensure halal practices are done according to Shariah principles required by regulatory authority	(Alam *et al*., 2012; Marzuki *et al*., 2012; Mukherjee and Romi, 2014)
Halal Awareness	1. The increase of consumer awareness related to Halal, leads my company to adopt Halal Standard. 2. The aspects of hygiene, sanitation and safety lead my company to adopt Halal Standard. 3. Halal concept triggers Muslim consumers to preferably consume product based on Shariah principles.	(Alam *et al*. 2011; Zailani *et al*. 2015)
Halal Integrity	1. The aspects of morality and religiosity lead my company to adopt Halal standards. 2. Halal standards lead us to build trust towards consumers. 3. Halal product has strong relationship with consumer needs.	(Alam *et al*. 2011; Zailani *et al*. 2015)

Expected Business Benefits	1. Adopting Halal Standard gives more profits to our business. 2. Halal Standard gives the competitive performance of the firms. 3. Ascertaining the halal standards provides sustainability of the business for the long run	(Alam *et al*. 2011; Zailani *et al*. 2015)
Entrepreneurial intensity	1. We give maximum effort without limitation of time to make sure the production process is Halal. 2. Our firm do "whatever it takes" to ensure the halal warehousing of the products. 3. We are Having a philosophy to do "whatever it takes" for ensuring halal standards/practices. 4. Our firm is willing to make significant sacrifices in order to stay in Halal business.	(Manzouri *et al*., 2013; Tan *et al*., 2012; Zailani *et al*., 2015)
ENVIRONMENTAL CONTEXT		
Competitive Pressure	1. We feel that we will lose customers to our competitors if we do not adopt Halal Standard. 2. We feel that it is strategic to adopt Halal standards to compete in the existing market place. 3. We feel that our firm will have to sustain their business if we implement Halal Standards.	(Manzouri *et al*., 2013; Tan *et al*., 2012; Zailani *et al*.,2015)
Consumer Pressure	1. The consumers are confident that Halal food fulfils the hygiene, sanitation and food safety. 2. Consumers require our firm to operate based on Halal requirements. 3. Believing perception leads to attitudes of the consumers.	(Manzouri *et al*., 2013; Tan *et al*., 2012; Zailani *et al*.,2015)
Halal Market Demand	1. High demand of Halal food leads our firm to adopt Halal Standards. 2. Halal market product has a wide growth with a high prospect in current and future market. 3. The Muslim communities require and emphasize the Halal products.	(Manzouri *et al*., 2013; Tan *et al*.,2012; Zailani *et al*., 2015)

INTENTION TO ADOPT HALAL WAREHOUSING		
Halal Warehousing (Adoption)	1. Our organization has an intention to adopt halal warehousing services in our operation near future. 2. Our organization will try to adopt halal warehousing services in our operation near future. 3. Our organization has a plan to adopt halal warehousing services in our operation near future.	(Ngah *et al*., 2019)

Table 1: Instrument Source

Data gathered from the employees working in the halal manufacturing industries, halal raw material providers and the warehousing services providers working in different cities of Pakistan. Responses are gathered through self-administered structured survey instrument. Total 157 filled questionnaires were received. For data collection. non-random, purposive sampling technique was used. Data was collected from the different cities and after data screening 142 valid data is used for further analysis.

Further, for data analysis and regression, Partial Least Square-Structural Equation Modelling PLS-SEM is used. This statistical technique is considered robust and appropriate when the data set is relatively small[57].

4. Analysis Results

4.1. Descriptive Analysis

In descriptive analysis it has been observed that in the industry 51 (35.9%) respondents belong to the other category which is not mentioned in the industry type. However, most of the respondent's designation was owner / CEO, up to 43% (62). Most of the respondents have experience of between 6-10 years, making up to 32% (46). Further details are shown in the table 2.

		Frequency	Percent
Industry Type	Baking Industry	15	10.6
	Pickles/Spices	19	13.4
	Beverages	5	3.5
	Snacks	12	8.5

	Confectionary	10	7
	Dairy Products	14	9.9
	Warehousing Service	16	11.3
	Others	51	35.9
	Total	142	100
Designation	Owner/Partner	62	43.7
	CEO/GM	17	12
	Senior Manager	12	8.5
	Manager	15	10.6
	Warehouse Manager	21	14.8
	Others	15	10.6
	Total	142	100
	Below 2 Years	23	16.2
	2-5 Years	40	28.2
	6-10 Years	46	32.4
	11 and above Years	33	23.2
	Total	142	100
No. of Employees	10-300	40	28.2
	301-700	20	14.1
	701-1000	49	34.5
	1000 and above	33	23.2
	Total	142	100

Table 2: Descriptive Analysis (N=157)

4.2. Outer Measurement Model:

This model calculates the reliability testing, convergent and discriminant validity of the data, all three measurements are explained in detail below:

4.2.1. Reliability testing:

Reliability testing refers that how much items are internally reliable, this testing is being used instead of Cronbach's alpha testing because of its better measurement. The composite reliability threshold for all variables should be >0.7 [58]. In table no III reliability test of all variables with the threshold.

4.2.2. Convergent validity

Convergent validity is the degree to measure whether the items are equally coherent. As per the[59] findings, he suggested that measuring the convergent validity is first of all, the value of each loading (CR) should be greater than 0.7. Secondly, the threshold of the AVE (average variance Extracted) must be greater than 0.5. Table 3 below depicts the value of the convergent validity.

Constructs	Items	Loading	P Values	CR	AVE
Compatibility	C1	0.905	0.000	0.938	0.834
	C2	0.909	0.000		
	C3	0.925	0.000		
Consumer Pressure	CONSP1	0.957	0.000	0.96	0.89
	CONSP2	0.939	0.000		
	CONSP3	0.934	0.000		
Competitive Pressure	CP1	0.845	0.000	0.912	0.775
	CP2	0.921	0.000		
	CP3	0.873	0.000		
	EBB1	0.955	0.000	0.968	0.911
	EBB2	0.965	0.000		

Expected Business Benefits	EBB3	0.944	0.000		
Entrepreneurial intensity	EI1	0.706	0.000	0.897	0.687
	EI2	0.891	0.000		
	EI3	0.802	0.000		
	EI4	0.902	0.000		
Halal Awareness	HA1	0.927	0.000	0.939	0.836
	HA2	0.884	0.000		
	HA3	0.932	0.000		
Halal Integrity	HI1	0.921	0.000	0.936	0.83
	HI2	0.896	0.000		
	HI3	0.915	0.000		
Halal Market Demand	HMD1	0.918	0.000	0.957	0.881
	HMD2	0.947	0.000		
	HMD3	0.95	0.000		
Halal Warehousing (Adoption)	HW1	0.921	0.000	0.958	0.884
	HW2	0.952	0.000		
	HW3	0.947	0.000		
Organizational Readiness	OR1	0.941	0.000	0.939	0.838
	OR2	0.919	0.000		
	OR3	0.886	0.000		
Perceived Benefits	PB1	0.901	0.000	0.873	0.775
	PB2	0.859	0.000		
	TMS1	0.918	0.000	0.956	0.879

Top Management Support	TMS2	0.932	0.000		
	TMS3	0.962	0.000		
Understanding the practices	UP1	0.909	0.000	0.941	0.841
	UP2	0.907	0.000		
	UP3	0.936	0.000		

Table 3: Reliability testing and Convergent Validity

4.2.3. Discriminant Validity:

Discriminant Validity analyze whether the constructed item is different from the other items. Calculating and analyzing the discriminant validity help us to understand that result doesn't have any statistical discrepancies.

Constructs	CI	CONSP	CP	EBB	EI	HA	HI	HMD	HW	OR	PB	TMS	UP
CI	0.913												
CONSP	0.712	0.943											
CP	0.625	0.863	0.88										
EBB	0.673	0.751	0.733	0.954									
EI	0.714	0.727	0.756	0.653	0.829								
HA	0.752	0.756	0.735	0.831	0.662	0.915							
HI	0.542	0.665	0.658	0.604	0.535	0.572	0.911						
HMD	0.572	0.828	0.803	0.682	0.728	0.677	0.49	0.938					
HW	0.685	0.869	0.866	0.74	0.681	0.764	0.634	0.794	0.94				
OR	0.722	0.816	0.854	0.766	0.807	0.801	0.654	0.769	0.804	0.915			
PB	0.801	0.725	0.69	0.694	0.684	0.767	0.681	0.533	0.709	0.765	0.88		
TMS	0.745	0.83	0.841	0.798	0.679	0.86	0.7	0.725	0.833	0.844	0.836	0.938	
UP	0.759	0.773	0.726	0.75	0.694	0.775	0.687	0.628	0.742	0.775	0.778	0.816	0.917

Table 4: Co-relation of the Discriminant Validity (Fornell and Larcker Criterian)

However, to measure the discriminant validity, it is not appropriate to rely completely on the Farnell and Larcker criteria, so the researcher also conducts crossings to measure discriminant validity. The item needs to be identified for measuring cross-loading by comparing the indicator loadings to the associated construct. The value of the construct should be higher than all of the loadings in the row and the difference among the other loadings in the row the row should be greater than 0.1. In the table 5 below, result shows that corresponding indicators are greater in the rows.

Items	CI	CONSP	CP	EBB	EI	HA	HI	HMD	HW	OR	PB	TMS	UP
C1	**0.905**	0.667	0.581	0.575	0.637	0.639	0.608	0.496	0.668	0.676	0.727	0.681	0.679
C2	**0.909**	0.666	0.577	0.631	0.674	0.709	0.463	0.571	0.599	0.654	0.694	0.674	0.746
C3	**0.925**	0.618	0.554	0.638	0.644	0.713	0.417	0.503	0.610	0.648	0.772	0.686	0.657
CONSP1	0.611	**0.957**	0.857	0.713	0.662	0.718	0.671	0.806	0.858	0.792	0.669	0.804	0.748
CONSP2	0.722	**0.939**	0.816	0.751	0.730	0.740	0.703	0.748	0.808	0.808	0.762	0.797	0.766
CONSP3	0.683	**0.934**	0.768	0.661	0.666	0.680	0.505	0.789	0.791	0.710	0.622	0.746	0.673
CP1	0.605	0.716	**0.845**	0.711	0.605	0.747	0.513	0.623	0.751	0.687	0.667	0.816	0.638
CP2	0.598	0.813	**0.921**	0.645	0.658	0.636	0.728	0.673	0.819	0.774	0.722	0.789	0.717
CP3	0.454	0.747	**0.873**	0.587	0.728	0.571	0.493	0.816	0.718	0.790	0.442	0.626	0.565
EBB1	0.631	0.730	0.717	**0.955**	0.613	0.819	0.577	0.675	0.730	0.730	0.670	0.781	0.723
EBB2	0.634	0.746	0.708	**0.965**	0.610	0.809	0.587	0.674	0.718	0.738	0.649	0.774	0.736
EBB3	0.663	0.672	0.673	**0.944**	0.647	0.751	0.566	0.602	0.668	0.724	0.668	0.728	0.687
EI1	0.655	0.610	0.615	0.688	**0.706**	0.745	0.500	0.528	0.601	0.635	0.643	0.688	0.776
EI2	0.624	0.624	0.619	0.570	**0.891**	0.571	0.299	0.692	0.552	0.698	0.549	0.530	0.508
EI3	0.444	0.500	0.595	0.356	**0.802**	0.324	0.417	0.569	0.474	0.640	0.430	0.434	0.378
EI4	0.584	0.634	0.651	0.475	**0.902**	0.464	0.527	0.608	0.588	0.680	0.588	0.536	0.551
HA1	0.719	0.725	0.708	0.826	0.631	**0.927**	0.542	0.667	0.737	0.777	0.725	0.815	0.759
HA2	0.605	0.583	0.581	0.647	0.537	**0.884**	0.440	0.517	0.614	0.641	0.642	0.705	0.592
HA3	0.729	0.751	0.718	0.794	0.640	**0.932**	0.575	0.660	0.735	0.769	0.731	0.830	0.760

HI1	0.504	0.584	0.571	0.517	0.478	0.532	**0.921**	0.420	0.595	0.555	0.626	0.639	0.631
HI2	0.429	0.568	0.535	0.503	0.421	0.464	**0.896**	0.391	0.487	0.542	0.567	0.579	0.574
HI3	0.540	0.658	0.680	0.621	0.552	0.559	**0.915**	0.518	0.640	0.679	0.660	0.685	0.665
HMD1	0.540	0.764	0.726	0.567	0.705	0.589	0.453	**0.918**	0.714	0.672	0.454	0.622	0.629
HMD2	0.551	0.787	0.767	0.678	0.677	0.678	0.481	**0.947**	0.767	0.741	0.521	0.705	0.571
HMD3	0.521	0.780	0.767	0.673	0.668	0.638	0.446	**0.950**	0.754	0.750	0.522	0.712	0.569
HW1	0.615	0.826	0.838	0.619	0.640	0.625	0.727	0.721	**0.921**	0.774	0.676	0.760	0.682
HW2	0.638	0.805	0.802	0.722	0.640	0.755	0.525	0.730	**0.952**	0.724	0.638	0.784	0.681
HW3	0.677	0.820	0.803	0.745	0.641	0.774	0.537	0.787	**0.947**	0.770	0.686	0.804	0.729
OR1	0.691	0.784	0.812	0.714	0.760	0.766	0.627	0.737	0.758	**0.941**	0.736	0.825	0.761
OR2	0.717	0.788	0.804	0.677	0.806	0.682	0.705	0.667	0.739	**0.919**	0.758	0.753	0.730
OR3	0.567	0.665	0.726	0.714	0.645	0.755	0.453	0.708	0.711	**0.886**	0.599	0.739	0.631
PB1	0.796	0.634	0.559	0.648	0.621	0.711	0.432	0.476	0.595	0.658	**0.901**	0.704	0.648
PB2	0.600	0.645	0.667	0.569	0.582	0.635	0.800	0.462	0.662	0.693	**0.859**	0.776	0.730
TMS1	0.736	0.788	0.801	0.665	0.665	0.746	0.729	0.612	0.784	0.800	0.855	**0.918**	0.739
TMS2	0.653	0.754	0.743	0.817	0.601	0.855	0.555	0.699	0.752	0.758	0.717	**0.932**	0.752
TMS3	0.706	0.792	0.821	0.761	0.645	0.817	0.683	0.725	0.806	0.817	0.781	**0.962**	0.802
UP1	0.703	0.716	0.666	0.680	0.640	0.686	0.684	0.573	0.706	0.744	0.751	0.744	**0.909**
UP2	0.672	0.683	0.663	0.724	0.627	0.745	0.519	0.599	0.660	0.673	0.665	0.743	**0.907**
UP3	0.714	0.727	0.669	0.661	0.643	0.703	0.685	0.556	0.675	0.714	0.723	0.758	**0.936**

Table 5: Factor Analysis

From the above table no 4 and 5, discriminant validity can be easily identified through their values which are matching the criteria of the cross-loading analysis and the fornell and larcker criterion model (1981).

4.3. Inner Model Hypothesis

Inner measurement is the step need to be taken after concluding the outer measurement model[60]. Likewise, the inner

measurement is also calculated through the Smart PLS model using Bootstrapping.

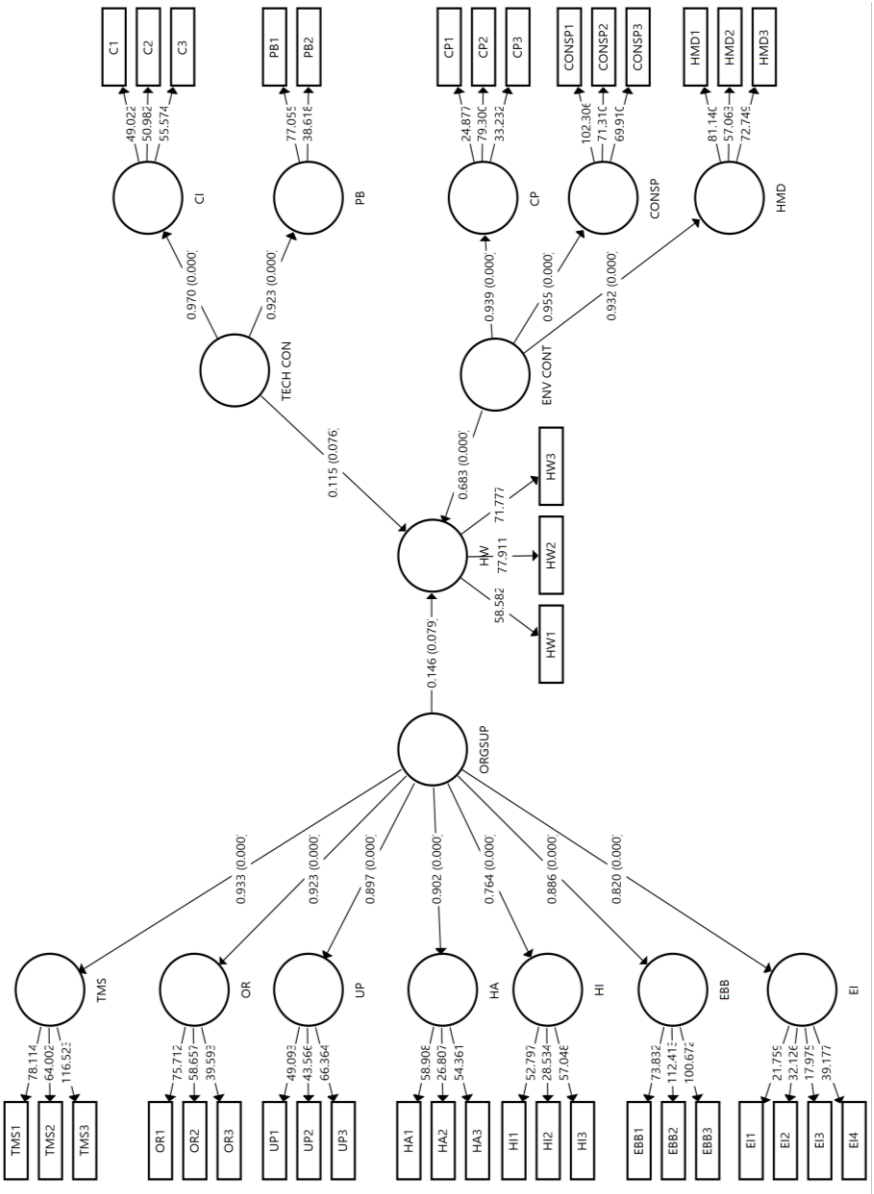

Figure 2 – Hypothesis Testing

4.3.1. Predictive Relevance of the Model

Criteria to make the inner model valuation is through the R^2 and the Q^2. The Model R^2 shows how much is the impact of the exogenous (Independent) variable is on the endogenous (dependent) variable. Literature[61] proposed R^2 value can be classified in the three

categories, if 0.6 or above, high. If between 0.3 To 0.6 Moderate and if below 0.3 it would be considered as low. The R^2 value for the inner model of this study appears as 0.81 which translates as high explanation of our endogenous variable from exogenous factors. Further, cross validation redundancy (Q^2) is another source to check the validity of the model, for Q^2 threshold is that it should be greater than zero. The value of Q^2 for this study appears as 0.71 which confirms the validity of our model.

4.3.2. Hypothesis Testing

Total three hypotheses have been constructed in this research paper. The significant and insignificant value can be decided through the p value, the threshold to determine the decision is that the value should be less than 0.10, for accepting the Hypothesis and if the value is greater than 0.10 it would be considered insignificant. In table 6a all variables of the technology have the significant impact on the compatibility and perceived benefits. Furthermore, in table 6b, all variables of the organizational context impact significantly on the expected business benefits, entrepreneurial intensity, halal awareness, halal intensity, organizational readiness, top management support and understanding the practices. In table no 6c, environmental context impacts significantly on the variable of the consumer pressure, competitive pressure and halal market demand. In the final table 7, technological context, organizational context and environmental context all have significant impact on the intention to adopt the halal warehousing, in this research study all three of the hypotheses have been accepted.

Dimensions of TECH CON	**Estimates**	**Standard Deviation**	**T-Values**	**P-Values**
TECH CON -> CI	0.970	0.007	148.687	0.000
TECH CON -> PB	0.923	0.016	58.838	0.000

Table 6a – Higher order reflective construct of Technical Context.

Table 6a depicts that in the technological context both variables have significant impact, however, CI (Compatibility) (ß=0.970, t = 148.687, p < 0.1) has the greater impact on the technology in comparison with the PB (Perceived Benefits) (ß=0.923, t = 58.838, p < 0.1) which has less impact on the technology.

Dimensions of ORGSUP	**Estimates**	**Standard Deviation**	**T-Values**	**P-Values**
ORGSUP -> EBB	0.886	0.025	35.203	0.000

ORGSUP -> EI	0.820	0.036	22.866	0.000
ORGSUP -> HA	0.902	0.021	43.545	0.000
ORGSUP -> HI	0.764	0.037	20.895	0.000
ORGSUP -> OR	0.923	0.018	52.093	0.000
ORGSUP -> TMS	0.933	0.012	75.314	0.000
ORGSUP -> UP	0.897	0.015	58.284	0.000

Table 6b – Higher order reflective construct of Organizational Context

Table 6b is representing hypothesis results of the organizational context, in the above table it is very obvious to notice that TMS (Top Management Support) (ß=0.933, t = 75.314, p < 0.1) has significant value and impact among all the others variables inside the organizational context, it means that top management support plays a critical role in the adoption of the halal warehousing. After TMS most observable variables in the list is OR (Organizational Readiness) (ß=0.923, t = 52.093, p < 0.1) it means that organizational readiness towards the halal standards is also very important. In the third rank, HA (Halal Awareness) (ß=0.902, t = 43.545, p < 0.1) does play an important role in the organizational context to implement halal warehousing. After that UP (Understanding the practices) (ß=0.897, t = 58.284, p < 0.1) working in the halal manufacturing firm, understanding the practices is an important factor to implement halal warehousing in the organization. EBB (Expected Business Benefits) (ß=0.886, t = 35.203, p < 0.1) expected business benefits is necessary variable in the organizational context to support the halal warehousing implementation. After that EI (entrepreneurial intensity) (ß=0.820, t = 22.866, p < 0.1). In the last HA (Halal Integrity) (ß=0.764, t = 20.895, p < 0.1) has the least impact on the organizational context to implement the halal warehousing. However, all the variables of the organizational context have significant p value.

Dimensions of ENV CONT	**Estimates**	**Standard Deviation**	**T-Values**	**P-Values**
ENV CONT -> CONSP	0.955	0.009	108.593	0.000
ENV CONT -> CP	0.939	0.014	65.746	0.000
ENV CONT -> HMD	0.932	0.014	64.412	0.000

Table 6c – Higher order reflective construct of Environmental Context

Let's take a look at the third variable of the higher order which is environmental context. It has 3 sub variables to support the hypothesis, if we take a look at them, CONSP (consumer pressure) (ß=0.955, t = 108.593, p < 0.1) CONSP is the most impacting variable in the environmental context, for implementing the halal warehousing in the organization, consumer pressure plays the most crucial part. In the 2nd rank is CP (Competitive Pressure) (ß=0.939, t = 65.764, p < 0.1) has significant impact in the environmental context. In the end HMD (Halal Market Demand) (ß=0.932, t = 64.412, p < 0.1) has also significant impact upon the environmental context. All three variables are necessary to implement the halal warehousing in the organization.

Hypotheses		Estimates	Standard Deviation	T-Values	P-Values
H1	TECH CON -> HW	0.115	0.065	1.778	0.076
H2	ORGSUP -> HW	0.146	0.083	1.758	0.079
H3	ENV CONT -> HW	0.683	0.061	11.279	0.000

Table 7 – Hypotheses result

The researcher developed three hypotheses, which were tested through PLS-SEM. The result indicates that all three hypotheses have insignificant impact on the halal warehousing, so all hypothesis have been accepted.

Hypothesis 1, the technological context, (ß=0.115, t= 1.778, p<0.1) according to the p value denotes that it has a significant value, it means that all the variable of the technology including Compatibility and Perceived benefits emphasize on the adoption of the halal warehousing, So H1 is supported. This hypothesis is in support with the study of[62].?

Hypothesis 2, the organizational context (ß=0.146, t=1.758, p < 0.1) result indicates that p value is less than 0.10 which clearly indicates that organizational variables have an impact on the adoption of halal warehousing. So H2 is supported. Hypothesis 2 has been previously supported[63].

Hypothesis 3, the Environmental context (ß= 0.683 t= 11.279, p < 0.1) as per the result p value is less than 0.10. It shows that environmental context has the significant impact on the intention to adopt halal warehousing. It means that all the variables of environment, including consumer pressure, competitive pressure, and halal market demand, emphasize adopting halal warehousing. So H3

is supported. All three variables have been supported by the previously published researchers[64].

5. Conclusion and Implications

Halal warehousing is a frequently emerging area around the world. Many food manufacturing industries are looking for to get the halal certifications and implement halal warehousing, but still so much effort is required to get the job done, especially in Pakistan. In this research, it was tried to find the gaps while implementing the halal warehousing? Among three hypotheses all of them have showed a significant impact on the halal warehousing however, many businesses in the country don't have the awareness regarding halal business. Technology plays an essential role in halal warehousing. Both the variables of the technology have been found significant. Moreover, organizational support has a significant role in halal warehousing implementation. Results revealed that a company cannot operate halal warehousing until not supported by top management support. The environmental factor will also be playing an important role in halal warehousing implementation.

Several implications have been found according to the results of this study. First of all, In terms of Environmental context, it is necessary for the government organizations such as food inspection should encourage firms to implement the halal warehousing, also it should be responsibility of the food inspection authorities to regularize and monitor the activities of the firms regarding the halal warehousing adoption. Secondly, under the top management support, Food manufacturing companies should open a department under inventory or warehousing department to implement the halal process in the companies.

Thirdly, on the basis of under the practices, employees working in the food manufacturing companies should be trained and must know what the *sharīʿah* compliant rules that must be followed in the organizations are. Employees working specially in the warehousing must understand the halal practices and its value. Fourthly, in the environmental context, firm's registering companies such as Securities and Exchange Commission of Pakistan should take this responsibility to give Entrepreneurs full awareness of halal warehousing and its benefits. Until the management doesn't know the benefits of the halal warehousing and halal standards, they won't implement the halal warehousing procedure in their companies. For implementing the halal warehousing top management supports plays an important part.

Fifthly, firms should observe the halal warehousing, but the raw material providers such as agricultural fields must ensure to keep

their stock safe from those ingredients that may harm or contaminant the material such as they use pesticides and preservatives during harvesting seasons. Before properly cleaning the material, they send them to the companies. Governmental agricultural departments should take the responsibility to ensure that agricultural fields ensure the halal warehousing practices to their side as well.

6. **Recommendations**

There are many recommendations for academic literature. First, sample size should be greater to understand the perception of the companies regarding halal warehousing. Small number of sample size cannot take the perception of all halal manufacturing firms. Secondly, data should not be collected from one city or from one region. Every firm follows the identical procedures of working based on the city; it is better to include the firms of different cities. If data is being collected from one region, we can't perceive all firms' result. Lastly, questionnaire should be framed in such a manner in which consumer's perception regarding the halal warehouse should also be taken..

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