

The Influence of Personal Factors on Hajj Crowd Perception among African Pilgrim Group in Mina

Badr Alsolami^{1,2*}, Mohamed Rashid Embi² and Wallace Imoudu Enegbuma³

¹Faculty of Islamic Architecture, College of Engineering and Islamic Architecture, Umm Al Qura University, Makkah, Saudi Arabia; badralsolami@gmail.com

²Department of Architecture, Faculty of Built Environment, University Technology Malaysia, 81310 Skudai, Johor, Malaysia

³Department of Civil Engineering, Faculty of Engineering, Computing and Science, Swinburne University of Technology, 93350 Kuching, Sarawak, Malaysia; wenebsuma@swinburne.edu.my

Abstract

Objective: This paper examines the effects of personal factors (expectation, control, sociability and mood) on perceived crowding levels among African group of pilgrims. **Methods/Statistical Analysis:** Data was collected via self-administered questionnaire from 156 African pilgrims to Hajj. The data was analyzed using SPSS for descriptive analysis and AMOS for Structural Equation Modeling (SEM). Internal consistency of the developed research instrument, Kaiser-Meyer-Olkin measure of sampling adequacy and exploratory factor analysis revealed that the research instrument was suitable. **Findings:** Among the African pilgrim group measurement model, control and sociability had the highest correlation while expectation and perceived level of crowding had the lowest correlation. Furthermore, control personal factor had the least insignificant impact on perceived level of crowding. Expectation and mood personal factors were both significant factors in this study. **Applications/Improvements:** Policy formation on managing crowd levels and perception will invariably be strategic via incorporating the findings of this paper. Future research will be extended to assess the effects of other factors such as physical factors Hajj pilgrims.

Keywords: Crowding, Hajj, Mina, Perception, Structural Equation Modeling (SEM)

1. Introduction

Perceived crowding is defined as the psychological counterpart to population density of an area^{1,2}. Found³ that crowding leads to stress feeling which can affect Hajj pilgrims' satisfaction. Recent crowding research focuses on the individual and their perception of such crowding situations while other theorist argue on the need to examine crowding as a group phenomenon⁴. Density of crowds is a measure of the number of individuals present per unit area in a particular location measured per square mile/kilometer⁴⁻⁶. Crowding studies shows that crowding is based on an act or event for example reduction in space, competition for resources and visual unattractiveness. This is proceeded by stimulation of an emotion mostly negative and finally a response to the crowd situation⁴. Pilgrims to Mina numbers in millions such as the official

number of over 3 million pilgrims in 2012⁷. Hence, the safety and psychological state of pilgrims is of utmost concern for authorities during the Hajj rituals⁷. Pilgrims react to perceive crowding in different ways which leads to reoccurring crowding disasters⁷. The impact of personal factors (expectation, control, sociability and mood) presents an overriding influence on crowding perception which underscores this study. Hajj pilgrims embark of the holy obligation to Mina with high expectations. However, found that crowding was beyond physical consideration but indirectly and environmental expectations⁸. The expectations from urban dwellers and rural dwelling attending an event differ. Crowd control is the ability of the pilgrim in exerting control or lack of control in the crowd situation⁴. Found that crowding control can be projected according to time of event, available resources, ease of access and managerial strategies⁹. Factors such as activity

* Author for correspondence

classification and method of data collection failed to effect crowding perception. Due to the continuous drive to attain sustainable pilgrim experience in Mina, this paper examines the effects of personal factors (expectation, control, sociability and mood) on perceived crowding levels among African group of pilgrims. Subsequent sections will assess the theoretical background of the study and presents the data results and discussions.

2. The Hajj

The Hajj journey is an obligatory ritual for every physically fit and financially capable Muslim. The journey includes the visit of the holy sites of Mecca, Mina, Muzdalifa and Arafat. The journey is broken down according to¹⁰ and¹¹ “on the first day, pilgrims visit the Sacred Mosque in Mecca and then stay overnight in Mina, about 6 km (3.7 miles) southeast of Mecca. On the second morning, pilgrims depart to Arafat, about 14 km (8.7 miles) southeast of Mina. At sunset, they make their way back and stay overnight in Muzdalifah, about 3 km (1.9 miles) southeast of Mina. On the third morning, pilgrims go to the Symbolic Stoning of the Devil Site, conduct rituals and then rest in Mina”. Similarly,¹⁰ and¹² describes the stoning of the devil at Mina valley as “comprises of three Jamarat: Al-Sughrah (small), Al-Wustah (medium) and Al-Kubrah (large), or Al-Aqabah. The three Jamarat are located along two connected straight lines, with about 135m between the small and medium, and about 225m between the medium and large. Each Jamarah comprises a post and a circular basin to collect pebbles”. A revolutionary urban planning study by¹⁰ saw the use of new scientific approaches and modern softwares to assess crowd management (agent-based simulation models, CA models and fluid mechanics models) by diagnosing problems, testing designs and setting operational plans on the ground. Figure 1 shows the flexible passage arrangement with density of crowd, crowd bubble technique and new bridge to accommodate future crowd management.



Figure 1. Elastic passage and New Bridge for Crowd Control¹⁰.

In proposed a new instrument of 104 questions accumulated from statements from pilgrims about crowd experience during Hajj¹³. The instrument sort to measure psychosocial elements on crowds and possible use for crowd dynamics, simulate crowding and Hajj management. Developed a trip assessment model called PEDSTREAM using a simulation-based temporospatial flow pattern to assess and project the congestion levels along pedestrian route, walkways and patterns for adequate individual planning of movement and Hajj management planning strategies¹⁴. In a separate location¹⁵ modelling *Tawaf* activities using the system of queue to simulate crowd movements and found that switching lanes during *Tawaf* contributed significantly to crowd density movement which reduces efficiency.

3. Hajj Crowding and Personal Factors

3.1 Expectations

Expectations determine the direction of satisfaction (negative or positive) when attending an event. Defined¹⁶ these responses as the individual belief that for a particular act there should be a corresponding outcome. Irrespective of the outcome, individuals readily expect different expectation from such an act. Hence, their expectations are determined by past experience, communication with other participants, present settings, personal traits, self-esteem and attractiveness of the outcome¹⁶. This phenomenon is studied in various settings from shopping, recreation and now religious pilgrimage. Satisfaction of participants was found to decrease at recreational boating events as the number of participants' increases. This is due to the overwhelming feeling that due to the coastal line and closeness to the lake, participants felt the crowd number could stimulate occurrence of an unsafe disaster¹⁷. Similarly, the increased number of participants formed a sight of distraction from the main recreational boating event¹⁷. According to¹⁸, the expectation of large amount of crowds moderates the effects of shoppers perception on crowd satisfaction in the shopping mall. Utilizing a wilderness attitude scale,¹⁹ found that different category of people example day and overnight users on a wildlife tour rated their personal experience and satisfaction based on their sensitivity level to crowds. To adequately accommodate expectations,²⁰ recommended the provision of realistic information about the situation

of the event to give participants a realistic expectation. The Hajj significance lays much emphasis on the spiritual expectations and this study will shed more light on the need to adequately anticipate and provide heightened services to meet pilgrim expectations. Hence, this leads to the first hypothesis of this study which states:

H₁: Expectations significantly affects perceived level of crowding in Hajj

3.2 Control

Control is defined as the “need to demonstrate one’s competence, superiority, and mastery over the environment”^{21,22}. This control characteristics are present in individual at any given time at which they experience the crowding and thus affect their response and assessment of the crowding levels^{22,23}. The possession of control drives individuals to exert a certain positive outlook when they are able to control their environment and the resulting opposite effect when unable to control their environment^{22,24}. Therefore, the way individuals cope and react to crowding is better managed due to anticipation and self-awareness on the crowd situation which leads to less chaotic coping behavior^{22,25}. Control was found to partially mediate the negative effect of spatial crowding on pleasure when placed in a crowded shopping environment²². To cater for the wellbeing of elderly in the society, architectural design need to take cognizance on the level of short term crowding and improve ways to control their environment²⁶. Similar to the relative importance of perceived control in the service industry which motivate customer and environment interaction, Hajj authorities are faced with the challenges of providing a smooth interaction between pilgrim and the environment in Mina^{22,27,28}. Control can be achieved through adequate provision of information of the layout and products^{22,29}. Well-equipped information centres mediates the relationship between the visitors emotions and the environment^{22,28}. Ultimately, no matter how high the density if an individual feels a sense of control, the individual reacts positively to the crowd situation^{22,28,30}. This discussions leads to the second hypothesis:

H₂: Control significantly affects perceived level of crowding in Hajj

3.3 Sociability

Sociability theory posits that individuals who like to be mix with other individuals regardless of their origins

feel most comfortable among crowds while the feelings decreases with the level of social perception⁴. Crowding in shopping malls was found to be stimulate positive effects on social shoppers while task shoppers opt to avoid crowded malls due to lack of control of the environment. The use of advertising, creativity in mall design and use of technology can counter such reactions for task shoppers and inclusion of food stalls also improves shopping experience for social shoppers³¹. Interaction with store employees research found that in crowding situations, customers preferred products with no social promotion by store employees rather than those with social promotion³². This denotes the tendency of social avoidance by some individuals. Although the Hajj requires group association to improve safety and coordination, individual within groups differ in terms of their threshold for association which lead to the third hypothesis:

H₃: Sociability significantly affects perceived level of crowding in Hajj

3.4 Mood

Mood determines the state of the individual when faced in the crowd situation. In controlling pilgrims mood¹, spatial crowding due to limited space invariably leads to negative dissatisfaction and spurs negative emotions. Similar study by³³, also found the same results amongst retail shoppers. Repeated exposure to crowded setting for elderly increasing their stress patterns which leads to erratic behaviors²⁶. The temperature during the Hajj ritual in combination with the crowd patterns could lead to a phenomenon³⁴ termed as excitation transfer effect where more often than not hot temperature increases the rate of hostility and hostile cognition among individuals. Emotional mood of shoppers in a shopping mall mediates the relationship towards crowding satisfaction¹⁸. Found²⁸ that as crowding levels increase, the pleasantness of a shopping experience diminishes. The mood of shoppers in a crowd improved with the provision of music and cultural decoration³⁵. Among Malaysian shoppers the need to communicate with store staffs and other customers is present which boost sales during festivities in combination with the presence of gender as a moderating variable among shoppers. Thus, mood in this study is hypothesized as:

H₄: Expectations significantly affects perceived level of crowding in Hajj

Having analyzed the theoretical background of this

study, Figure 2 presents the hypothesized theoretical relationship of the crowding level model.

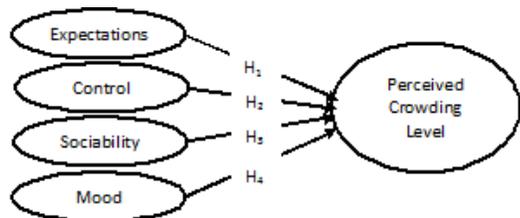


Figure 2. Conceptual perceived crowding level model.

4. Methodology

The data was collected in Mina during the Hajj season of 2015. Pilgrims were categorized into seven (7) main Hajj groups by the Saudi Hajj Ministry; the south-eastern Asia pilgrims, the (non-Arab) African pilgrims, the Arab pilgrims, Turkish and Muslim pilgrims in Europe and America, the Southern Asia pilgrims, the Iranian pilgrims and the Internal pilgrims³⁶. For this paper, the main focus was towards the African pilgrims. The African pilgrims were randomly selected from the massive numbers of pilgrims visiting Mina. The research instrument was divided into two (2) sections; demographic and constructs measure. Demographics were mainly ordinal responses while construct measure section utilized the four (4) point Likert scale for responses from 1 strongly disagree to 4 strongly agree, in order to receive certain tendency from the respondents³⁷. 200 questionnaires were distributed to the African pilgrims, 165 were returned forming an acceptable return rate of 75%, while 9 were unusable. The data was analyzed using Statistical Package for the Social Sciences (SPSS) for descriptive analysis and Analysis of Moment Structures (AMOS) for Structural Equation Modeling (SEM). Instrument reliability and validity was also carried out.

Instrument reliability assesses the stability and comprehension of respondents towards the research instrument to adequately measure the variables of this study³⁸⁻⁴⁰. Cronbach Alpha values are used to determine the internal consistency of the multiple scale items aimed at measuring how similar the item measuring same variable are interrelated^{38,39,41}. Hence, the data was examined for internal consistency on the instrument administered as shown in Table 1,2. The 5 personal factors and perceived crowding level were made up of 14 items (expectation-3, control-3, sociability-2, mood-3 and perceived crowding level-3) from the theoretical background. All the variables

produced Cronbach Alpha values of above 0.60, which is above the recommended minimum threshold^{39,41,42}. The responses were measured through a Likert scale which allows for freedom of opinion and relative ease of data analysis with the assumption that strength/intensity of experience is linear⁴¹⁻⁴³.

Table 1. Demographics of respondents

		Frequency	Percentage
Gender	Female	48	30.8
	Male	108	69.2
Marital status	Single	42	26.9
	Married	114	73.1
Living place	A mega city	24	15.4
	A city	87	55.8
	A town	24	15.4
	A village	21	13.5
Length of stay	commute from Makkah	7	4.5
	More than two nights	91	58.3
	Two nights	58	37.2
Mode of Transportation	Others	3	1.9
	By motorcycle	1	.6
	By train	12	7.7
	By bus	90	57.7
	On foot	50	32.1

Table 2. Reliability of the instrument

Items	Cronbach Alpha
Expectation	0.868
Control	0.838
Sociability	0.700
Mood	0.874
Perceived Crowding Level	0.918

Instrument validity assessed the sample adequacy and multivariate normality measured by the results from the Kaiser-Meyer-Olkin (KMO) and Bartlett’s test of sphericity values which assesses the appropriateness of the proposed grouping of attributes^{38,41}. KMO test is a measure of sampling adequacy that compares the magnitudes of the partial correlation coefficients of the items measuring the variables, while Bartlett’s test of sphericity tests if the correlation matrix is an identity matrix. The KMO for this study shown in Table 3 is 0.704 which is above the accepted minimum of 0.6 and the Barlett’s Test of sphericity is Significant by p<0.05^{39,42}.

Instrument validity is further tested through Exploratory Factor Analysis (EFA). In order to examine

the dimensionality of the variables and for better interpretability of factor loadings, a Principal Component Analysis (PCA) with Varimax rotation is performed. In PCA all of the factors extracted are initially orthogonal (uncorrelated) to each other, implying they are completely independent of one another and as such amenable to interpretations. Rotation increases the magnitude of loadings for certain variables while at the same time decreasing their cross-factor loadings^{42,44}. Factorial rotations of axes are divided into two types (orthogonal and oblique). In analysis where the orthogonality of various pairs of axes is retained, they are called orthogonal rotation or in reverse cases called oblique. The rotation in this study is problem dependent stemming the need for varimax rotation which is the orthogonal rotation of factors towards a successful popular analytic approach³⁸. Table 4 shows the rotated component matrix for this study with all factors of expectation, control, sociability, mood and perceived crowding level possessing no cross loadings.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.704
Bartlett's Test of Sphericity	Approx. Chi-Square	1328.920
	df	91
	Sig.	.000

Table 4. Rotated component matrix

		Component				
		1	2	3	4	5
Expectation	PFE1		.862			
	PFE2		.930			
	PFE3		.854			
Control	PFC1				.904	
	PFC2				.882	
	PFC3				.775	
Sociability	PFS2					.738
	PFS3					.893
Mood	SFBO1			.832		
	SFBO2			.871		
	SFBO3			.890		
Perceived Crowding Level	LCP1	.947				
	LCP2	.867				
	LCP3	.954				
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 5 iterations.						

5. Results and Discussion

5.1 Demographics

In Figure 3 African pilgrims are predominantly aged between 31-40 years (33%), 21-30 years (31%), 41-50 years (14%) and the lowest group of above 70 years (1%). Younger pilgrims drive for adventure and elderly frailty in this study impacts how these groups of pilgrims perceive crowding. In terms of education, High school had the highest occurrence of 27%, BA/B.Sc./B.Eng. (22%), read and write (19%) and illiterate and PhD had the lowest by 6%.

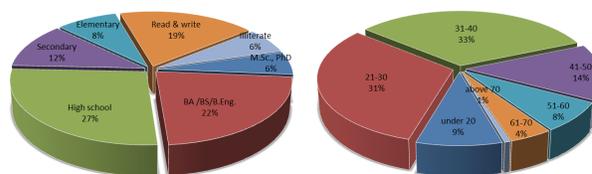


Figure 3. Age and education level of respondents.

Demographics of Respondents revealed that 69.2% of the respondents were male while 30.8% are female. This is consistent with the predominance of Male pilgrims among African group. Most of the African pilgrims were married having 73% while the remaining 26.9% are single. Due to the age category of this class of pilgrims, it is expected to derive a large amount of married pilgrim within this group. The economic undertone of African nations direct a high number of people resident within the cities by 55.8%. Hence, the ways individual from cities in comparison to those from a village perceive crowding differs. 58.3% of African pilgrims prefer to spend more than two nights in Mina as opposed to commuting from Mina which was 4.5%. The bulk of African pilgrims prefer bus transportation to journey to Mina and a noteworthy 32.1% arrive by walking.

5.2 Measurement Model

A measurement model demonstrates the existing relationships between items and their underlying latent construct. The fit values for both measurement and structural models have to fall within at least one of three fit index categories namely; absolute fit, incremental fit and parsimonious fit^{39,41,42,45,46}. The minimum thresholds

of indices in measuring measurement and structural models are shown in Table 5.

MM fit are as extracted in Table 5 by previous researchers^{41,42,45}.

Table 5. Results of GOF measures^{39,42,45,46}

Goodness-of-fit (GOF) measure	Recommended GOF level
P-value	≥ 0.00
X ² /df (CMIN)	≤ 2.0
GFI	0 (no fit) to 1 (perfect fit)
AGFI	0 (no fit) to 1 (perfect fit)
NNFI	0 (no fit) to 1 (perfect fit)
CFI	0 (no fit) to 1 (perfect fit)
RMSEA	<0.05 (very good fit); 0.05-0.08 (Fairly good fit); 0.08-0.1 acceptable; > 0.1(unacceptable)

The statistics in Figure 4 shows that the measurement model had a RMSEA value at 0.5, CFI at 0.97 and close to a perfect fit and CMIN of 1.72. The fit statistics are adequate within the acceptable thresholds and factor loadings to establish convergence validity of the perceived crowding level. The highest correlation occurred between personal factors of control and sociability by 0.45. This denotes the fact that when pilgrim begin to feel a sense of control within their crowded environment, a certain comfort occurrence gives rise to the freedom to interact with other pilgrims and Hajj authorities around them which was consistent with previous research^{22-26,28,30}. The next correlation was found between sociability and mood by 0.44. This findings was consistent with previous research in other sectors such as building design, retailing and tourism^{1,31,32} which pits sociability against the mood levels of the individual. In this setting, when a pilgrims mood is within acceptable limits, the more the increase in the tendency to socialise and vice-versa. Mood correlated to expectation by 0.29, which revealed that the more the pilgrim expectations are met the more the increase in their mood. Mood also showed a 0.28 correlation with perceived crowding level which was consistent with previous research^{1,26,33,35}. Mood had the highest correlation to perceived crowding level in this study while expectation, control, sociability had values of -0.05, 0.08 and 0.10 respectively. A noteworthy outcome in this measurement model lies in the inverse relationship between expectation and perceived crowding level. This findings although similar to those in other sectors^{22,23,25,26,28,30} highlights the fact that when pilgrims expectation for the Hajj ritual including the overall

satisfaction with the environment in Mina, the level of sense of been crowded diminishes.

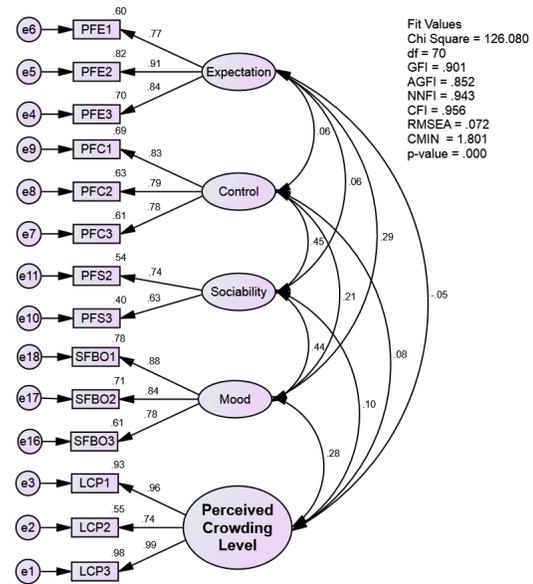


Figure 4. Perceived crowding level structural model.

5.3 Structural Model

The structural equation model in Figure 5 and resulting path test of two-tailed significance in Table 6 revealed that out of the four variables determining perceived crowding level. Mood of pilgrims has the highest significant impact of 0.34 on perceived crowding levels. This finding are consistent with previous research^{1,18,26,33-35} which highlights the pivotal importance of mood in a crowded setting. Spatial design alteration and stimulants to reduce temperature are among suggestions to improve the mood in other settings from previous research. Interestingly, the mood among African pilgrims were highly affected by the physical contact resulted from activity in Mina, such as stoning the Devil. To effectively improve the mood of pilgrims, Hajj authorities need to constantly generate ways to uplift the pilgrim’s mood to reduce the sense of crowding. Expectation had an inverse significant impact of -0.15 on perceived crowding levels in this study. This findings are consistent with previous research^{16-19,47,48} which posit that when expectations are met, the individual perception of crowding reduces. Determinants such as past experience, communication with other participants, present settings, personal traits, self-esteem and attractiveness experiences by pilgrims impact on the way they perceive expectations during the Hajj. This suggest that improvements in the level of communication

and training of staffs to handle inquiries and appropriate safety measures will improve the level of expectation for pilgrims. Sociability had an inverse insignificant impact of -0.06 on perceived crowding levels. Due to the nature of Hajj rituals and because it might be performed only once, certain pilgrims might feel the need not to communicate with other pilgrims and prefer to focus on the worshiping rites. This is consistent with previous findings of³¹ where task shopper focus solely on the task at hand and without the temptations of other distractions. The findings also suggests that African pilgrims from the other category of pilgrims may not necessarily engage in discussion with Hajj authorities during Hajj rituals which are consistent with³². Control had to lowest inverse insignificant relationship of 0.05 on perceived crowding levels in this study. This implies that the direct increase in control inversely leads to a decrease in perceived crowding levels. Previous research suggests improvements in building design and information provision to counter this phenomenon. However, efforts towards technological improvements^{10,13,15} are on the increase and facilities need to be improved to cater for alternate designs and information provision.

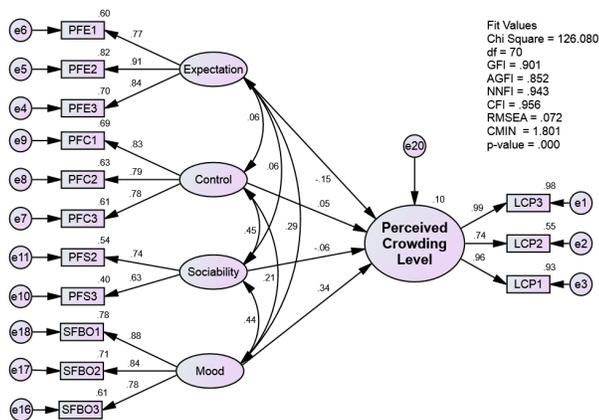


Figure 5. Perceived crowding level structural model.

6. Conclusion

This study set out to assess perceived crowding levels of pilgrims in Hajj which was examined using the personal factors of expectation, control, sociability and mood. The research instrument was validated which can be utilized for further research in Hajj settings. The measurement model revealed that sociability had the highest correlation to control and mood. This affirms that pilgrims will

communicate/interact better when they perceive an improvement their ability to control the environment and also the mood levels. Mood, sociability, control and expectation all had impact on perceived crowding levels. Although, the relationship between expectation and perceived crowding levels was inverse. In the structural model, expectation and mood were significant while control and sociability were insignificant. The impacts listed according to weight are mood, expectation, sociability and control. This study revealed that the pilgrim's mood during the pilgrim rituals in Mina was considered as the most important factor by the pilgrims and buttresses the key area for improvement regarding the African pilgrims to Hajj in Mina. To continually meet the personal factors improvement for African pilgrims, adequate information on the environment in Mina needs to be improved, improvements in technology monitoring of pilgrims, inter-personal interaction training for Hajj authorities and provisions outlets for rest and digital displays. Further research will assess other dimensions which affect crowding perceptions.

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