

Assessment of University Residence Foodservice Using Importance-Performance Analysis (IPA): Student Perspective (A Case Study of Sadat City University)

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Abstract

University residence foodservice aspects which need to be prioritized for improvements have not been assessed yet via Importance-Performance Analysis (IPA) approach although it has been broadly applied in numerous fields and environments. Therefore, this study investigates the student perceptions of university residence foodservice aspects (i.e. food, service, ambiance, sanitation, and management supervision) using IPA. It also explores which foodservice aspects influence student satisfaction. In addition, this study examines whether management supervision affects the other residence foodservice aspects or not. A questionnaire was developed to achieve these objectives. The IPA and regression analysis were used to analyze the returned 435 questionnaire forms collected from Sadat City University students. The IPA shows that food, service, and sanitation are three key areas where improvement efforts should be made. Moreover, the regression analysis identifies that only three aspects (i.e. service, food, and management supervision) were found to significantly affect student satisfaction, respectively. The study highlights an additional key finding that management supervision has a significant effect on the other foodservice aspects, particularly sanitation. Thus, university management should reasonably allocate their limited resources to residence foodservice attributes based on their contributions to student satisfaction.

Keywords: University foodservice, service aspects, student satisfaction, importance-performance analysis, residence.

Introduction

Universities not only provide their students with education, but also various services in support of its educational mission, such as bookstore operations, computing centres, student housing, foodservice operations, vending, grounds maintenance, child-care centers, health facilities, mail delivery, and security services (Goldstein *et al.*, 1993). All institutions of higher education have complex and diverse foodservice operations that provide a variety of food options for their customers (Matsumoto, 2002; Brotherton, 2003; Davis *et al.*, 2008). They could be classified according to the type of catering facilities into two fundamental categories: (1) central facilities, that are open to all students (residential and non-residential) and staff, usually serve lunches and snacks throughout the day, and (2) residential facilities, that may serve meals within an inclusive price per term, are an important logistical component of universities (Davis, *et al.*, 2008).

University residences are considered one of the most important support organizations which provide three meals daily for students. Residence foodservice is not only connected with student health, mood and the successful completion of their studies, but also the effectiveness of education process, university stability and development (Li *et al.*, 2008; Pan, 2009). Making students satisfied is a main concern for university management. It is not just to solve the problem of feeding students, but also to supply rich and varied cuisine, attentive service, relaxing atmosphere, and safety (Gao *et al.*, 2010). However, student consumption behaviour is frequently not inspired by strong willingness but external reasons. Students sometimes have no choice to eat outside the residences (Chen, 2006). They may be imposed to eat their meals in the dining halls, although this may make them not to feel satisfied (DeJesus and Tian, 2004; Xiaoyan *et al.*, 2012). Although many studies were conducted in the area of university foodservice (e.g. Lee and Leong, 2004;

Kim et al., 2009; Joung et al., 2014), there is a scarcity of studies investigating the key foodservice aspects in university residence dining operations via IPA approach.

Service aspects have frequently been noticed as a salient antecedent of customer satisfaction in the service industry (Namkung and Jang, 2007). In the restaurant industry, the elements affect customer satisfaction comprise service, value, ambiance, food product and management control (Lattin et al., 1995). For university foodservice, it was found that there were four main factors influencing student satisfaction: dining ambiance, food, service, and eating conditions. The impacts of these four factors on student satisfaction are different (Gao, 2009; Xiaoyan *et al.*, 2012). The overall purpose of this study, therefore, is to explore the key foodservice aspects influencing student satisfaction in university residence foodservice operations. To accomplish this overall aim, this research is focused on four specific objectives: to investigate student perceived importance of foodservice attributes when visiting residence dining halls; to examine student perceptions concerning the performance of foodservice operation; to locate the attributes of each foodservice aspect on the IPA grid; and to identify the effect of management supervision on the other foodservice aspects.

Literature review

Importance-performance analysis technique

The IPA technique, was first introduced by Martilla and James (1977), is a basic analytical decision tool (Matzler *et al.*, 2003; Azzopardi and Nash, 2013) that identifies which the product or service attributes a firm should focus on to enhance customer satisfaction (Matzler *et al.*, 2004; Deng *et al.*, 2008). IPA has been applied as an effective means of identifying the strengths and weaknesses of products and services (Chapman, 1993; Chu and Choi, 2000), determining improvement prioritization (Sampson and Showalter, 1999; Azzopardi and Nash, 2013), mobilizing and distributing scarce resources to where they are needed most (Levenburg and Magal, 2005), and coordinating strategic planning efforts to enhance relative competitiveness (Matzler *et al.*, 2004).

The strategic framework of Martilla and James (1977) is beneficial because it is capable of examining the importance and performance of the product/service attributes simultaneously (Slack, 1994). IPA generates four different suggestions derived from the combination of importance and performance scores of each attribute (Oh, 2001). Although measures of importance and performance can yield valuable information independently, the full potential and promise of this type of information are more likely to be realized when the two concepts are merged (Martilla and James, 1977; Shaw *et al.*, 2002; Tarrant and Smith, 2002; Wade and Eagle, 2003; Haahti and Yavas, 2004; Levenburg and Magal, 2005).

The IPA has been broadly applied in numerous fields and environments comprising education (Alberty and Mihalik, 1989; O'Neil and Palmer, 2004); healthcare (Abalo *et al.*, 2007); banking (Matzler *et al.*, 2003); e-business and IT (Skok *et al.*, 2001); and the automotive industry (Martilla and James, 1977). In addition, IPA has achieved prevalent acceptance in the hospitality and tourism research (Azzopardi and Nash, 2013); encompassing food services (Sampson and Showalter, 1999; Tontini and Silveira, 2007); and hotel and lodging services (Chu and Choi, 2000; Beldona and Cobanoglu, 2007). The decision to use the IPA technique was due to its simplicity and the appealing methods of presenting strategic recommendations (Oh, 2001; Taplin, 2012; Azzopardi and Nash, 2013).

Importance-performance diagram involves plotting the mean ratings for importance and performance on a two-dimensional grid divided into four quadrants (Skok *et al.*, 2001; Levenburg and Magal, 2005; Taplin, 2012), as shown in *Fig. 1* that provides a visual

display of the results and potential strategic outcomes (Azzopardi and Nash, 2013). The vertical axis depicts the customer perceptions of the importance of the product/service attributes and the horizontal axis illustrates their judgment of the provider performance in meeting the demands on each attribute. The four identifiable quadrants are concentrate here, keep up the good work, low priority, and possible overkill (Chu and Choi, 2000; Sörensson and Friedrichs, 2013).

Quadrant (A): high importance and low performance (concentrate here)

This quadrant is the most critical categorization because it provides a classification of attributes on which the company does not perform well in areas the customers judge as salient. These elements represent key challenges and require immediate corrective action as they are underperforming and should be given top priority with regard to resources and effort. The factors identified in this quadrant demonstrate major weaknesses and threats to competitiveness. Policy changes and strategies should focus on directing marginal resources and extra effort to these attributes (Levenburg and Magal, 2005; Coghlan, 2012; Azzopardi and Nash, 2013).

Figure 1: Importance-Performance Analysis Grid.



Sources: Martilla and James (1977) and Chu and Choi (2000).

Quadrant (B): low importance and low performance (low priority)

Elements positioned in this area do not represent an immediate competitive threat and are viewed as minor weaknesses. These items are likely to receive a low priority in resource allocation decisions and may be candidates for discontinuation of resources/effort. If no gains can be achieved from improved performance, extra effort in this area is unnecessary (Oh, 2001; Levenburg and Magal, 2005).

Quadrant (C): low importance and high performance (possible overkill)

Attributes falling within this part are indicative of over performance. Marginal resources are being directed at elements that are insignificant strengths to the organization and that have minimum impact on the firm’s relative competitiveness (Levenburg and Magal, 2005). These attributes indicate a possible overuse of resources and should command the lowest priority for improvement (Murdy and Pike, 2012). Cost cutting strategies may be appropriate to release resources and effort to be diverted elsewhere (Azzopardi and Nash, 2013).

Quadrant (D): high importance and high performance (keep up the good work)

Factors located in this quadrant indicate a firm’s success in meeting customer standards of performance in areas which customers deem relevant. They represent major strengths and

indicate opportunities for achieving competitive advantage that require a maintenance posture or exploitation. It is assumed that scarce resources are being effectively allocated where they are needed most and that the current action strategies should be kept in place or enhanced (Graf *et al.*, 1992; Deng *et al.*, 2008).

Food service aspects influencing student satisfaction

Gunderson *et al.* (1996) defined customer satisfaction as the post consumption judgment of a service that could, in turn, be measured by assessing customer's evaluation of a performance on specific attributes. Andaleeb and Conway (2006) adopted another definition for customer satisfaction; they defined customer satisfaction as the overall level of contentment that customers receive from service features. Customer satisfaction can be defined in a variety of ways, but in its simplest terms it is simply something that brings pleasurable fulfilment. This sense of fulfilment is entirely dependent on (a) the perceptions of the consumer, (b) if the consumption of a product has fulfilled some desire or need, and (c) that the fulfilment brings pleasure (Oliver, 1997).

A challenge to university residence foodservice facilities is that students, when given a forced choice, often feel bad because of losing their decision-making autonomy. Consequently, they become increasingly hard to satisfy and may eventually seek other possibilities (Kim *et al.*, 2004). In many instances, the college students are captive to their food service providers with few choices of the offered items. With tuition costs going up every year and costs of other services edging up commensurately, students should be more demanding and expect the best in terms of the final service they are delivered. It is important, therefore, that university residence foodservice needs to be monitored periodically whereby college administrators can improve service delivery. For colleges, dissatisfaction with food services could mean students making their own arrangements; reconsidering their college decision (Andaleeb and Caskey, 2007).

It is important to discover service quality attributes that can build loyalty as a relationship with customers (Shankari and Suja, 2008). These attributes (tangible and intangible) are essential in understanding perceived service and consumer satisfaction (Andaleeb and Caskey, 2007; Kim *et al.*, 2009; Kwun, 2011). According to Reuland *et al.* (1985) attributes of foodservice could be classified into three aspects: physical product, behavior and attitude of the employees, and the ambiance. Harrington *et al.* (2012) also suggested that there are many potential quality attributes that have been broken down into three categories: food quality, physical environment (décor/atmosphere), and service quality. These three elements were found to directly or indirectly influence customer overall satisfaction with foodservice quality (Sulek and Hensley, 2004; Namkung and Jang, 2007). If managers know which foodservice aspects have the specific impact on customer satisfaction, they could potentially recognize the major cues of success or failure in foodservice settings (Hwang and Zhao, 2010). Thus, a number of studies on customer satisfaction have focused on identifying these factors. However, there is no general agreement on which of these aspects is the best; food quality, ambiance, or service quality (Lam and Zhang, 1999; Su, 2004; Sulek and Hensley, 2004; Harrington *et al.*, 2012).

Food quality has been generally accepted as a major factor influencing customer satisfaction (Gupta *et al.*, 2007; Liu and Jang, 2009). For instance, Sulek and Hensley (2004) measured the relative importance of food, atmosphere, and service in a high-quality restaurant and found that food quality was the most important aspect affecting customer satisfaction. Moreover, Dube *et al.* (1994) found that food quality was far more important to customers than all other attributes when investigating the relative importance of seven foodservice attributes in a full-service restaurant.

Food quality has been studied in various aspects, e.g. temperature, taste, flavour and texture (Kwun and Oh, 2006; Namkung and Jang, 2007; Kim *et al.*, 2009; Kwun, 2011). Temperature was found as a crucial part of food quality affecting the overall satisfaction with a meal (Johns and Tyas, 1996; Kivela *et al.*, 1999). Additionally, Kivela *et al.* (1999) identified food taste as the most important attribute in the dining experience, although the other factors contribute to it. Besides the above-mentioned food attributes, nutritional information regarding food items was found to drive satisfaction (Siguaw and Enz, 1999). In restaurants, customers not only buy meals, but also buy their experiences such as service, ambiance, and entertainment (Pun and Ho, 2001). Ambiance is perceived as the quality of the surrounding space (Kotler, 1973). It is the aesthetic or emotional effect of an organization on its clients (Dittmer, 2002). Ambiance often leads patrons to prefer one establishment more than another. Some customers believe that a restaurant atmosphere may be as important as food, or even more important. Moreover, ambiance can even enhance how food tastes to clients (Angelo and Valdimir, 1994). The factors that contribute towards creating an atmosphere, such as music, lighting, color, and aroma were found to have a direct effect on customer satisfaction (Bitner, 1992; Turley and Milliman, 2000). Additionally, previous research (e.g. Pettijohn *et al.*, 1997; Kim *et al.*, 2009) has shown that convenient location and cleanliness are important cues affecting customer satisfaction.

Service is one of the basic elements of success for foodservice operations (Lattin *et al.*, 1995). Perceived service quality is frequently defined as the customer evaluation of the overall excellence or superiority of the service (Zeithaml, 1988). It is the customer judgment that is brought about by comparing expectations and perceptions of the service experience. Rande (1996) stated that, the service is important for two reasons: (1) It determines value for the guest, and (2) it has a direct impact on the dining experience of the guest. Parasuraman *et al.* (1988) mentioned five dimensions of service quality: tangibles (physical facilities, equipment, and appearance of personnel); reliability (ability to perform the promised service dependably and accurately); responsiveness (willingness to help customers, providing prompt service, and correcting problems immediately); assurance (having the required skills and knowledge, providing courtesy, and being able to inspire trust and confidence); empathy (caring and individualized attention the firm provides to its customers). In restaurant settings, since clients not only judge the food quality but also the service interactions, perceived service quality is seen as a main factor affecting their satisfaction (Liu and Jang, 2009). Service was found to be more important than food in explaining customer satisfaction (Yuksel and Yuksel, 2003; Andaleeb and Conway, 2006).

Sanitation is another very important attribute could be added to food, service, and ambiance attributes that influence satisfaction. Several authors (e.g. Gilmore *et al.*, 1998; Giampaoli *et al.*, 2002; Henroid and Sneed, 2004) stated some unacceptable food handling habits that occur in university residence foodservice operations, for example inadequate hand washing, unsuitable hair restraints, inappropriate eating and drinking in food preparation areas, and insufficient cleanliness and sanitation of utensils and equipment. The sanitation of a residence foodservice operation is assessed by students in all stages of their dining experience. Both intentionally and unintentionally, they make use of their sense of smell to decide whether an operation is satisfactory or not. Personal hygiene and the uniform cleanliness are evaluated to judge the foodservice employees. To obtain an overall judgment on the cleanliness and sanitation of the operation, students combine their opinions in all of foodservice areas (Rande, 1996).

Managers play an important role in generating a positive dining experience by running each shift efficiently, effectively, and in accordance with procedures. They help employees

carry out their duties according to the standards established by the organization. They must monitor, enhance, and control employee performance (Goodman, 1996; Mill, 2001). No foodservice organization can achieve success if management team does not practice excellent supervision and makes sure that the foodservice establishment meets prerequisite standards (Lattin *et al.*, 1995).

Based on the literature review, this study assesses student perceptions of university residence foodservice in terms of food, service, ambiance, sanitation, and management supervision aspects as well as identifies the most important aspects influencing student satisfaction.

Research methodology

To achieve research objectives a single embedded case study was used. Embedded case study involves more than one unit of analysis (Scholz and Tietje, 2002). According to Yin (2003) the study here used cross-case analysis, which allows the ability to examine sub-units that are situated within the larger case (Sadat City University). Research data can be analyzed across six subunits (faculties), i.e. commerce, law, veterinary, tourism and hotels, physical education, and education. Two institutes (Environmental studies and research institute, and Genetic engineering and biotechnology research institute) were ignored as they have no undergraduate students.

Instrument

Using interviews in constructing questionnaire is strongly recommended by several authors (e.g. Oppenheim, 2000; Morgan and Symon, 2004). By conducting interviews with 30 students majoring in hotel studies, supposed to have a good background of foodservice, and reviewing existing literature on university foodservice (e.g. Kim *et al.*, 2004; Andaleeb and Caskey, 2007; Kwun, 2011; Harrington *et al.*, 2012; Kim *et al.*, 2012), 38 food service attributes were identified. The questionnaire was consisted of three parts: six items about demographic data; thirty-eight items expressing student perceptions of university residence foodservice attributes; thirty-eight items indicating how important these attributes for students. The 38 questions in the last two parts were measured via a 5-point Likert scale (1= completely disagree and 5= completely agree). One additional question, "overall satisfaction with the provided university residence foodservice", was included to serve as an indicator to identify the student satisfaction level. A five-point Likert scale was also used to measure this overall satisfaction. A total of 500 questionnaires were randomly distributed to Sadat City University students in the investigated university residences. Only 435 complete questionnaires were received, representing a response rate of 87 percent. This study utilizes the coefficient of Cronbach's alpha to compute the reliability. Values exceeding 0.70 indicate high credibility (Nunnally and Bernstein, 1994). The study tests indicate high internal consistency (coefficient = 0.96). Finally, the instrument was validated through computing the correlation between the main five dimensions and their total average (R is between 0.62 and 0.91, *P*-value < .01).

Data analysis

The data analysis was conducted using Statistical Package for the Social Sciences (SPSS 20). Descriptive statistics were employed to identify the student perceptions of importance and performance of the investigated attributes, and comparing means of these perceptions with the student demographics. In addition, IPA tool and regression analysis were used to analyse the data.

Results and discussion

Demographics as a part of the study included gender, age, length of stay, average number of meals, specializations, and university year. Among the 435 students, 62.5% of students were male and 37.5% were female. About 66% of the students were aged between 17 and 19, while approximately 34% of them were aged between 20 and 26. About 22.5% of the students attended one semester, 19.3% attended two semesters, 30.3% attended three semesters, 11.3% attended four semesters, and 16.6% attended five semesters. Also, students represent different specializations (i.e. commerce, law, veterinary, tourism and hospitality, physical education, and education) where, 25.5% of students were in the first university year, 30.1% were in the second university year, 15.6% were in the third university year, 27.4% were in the fourth university year, and finally 1.4% were in the fifth university year.

In analyzing the relationships among the student perceptions of both importance and performance of foodservice attributes and the student demographics, it was found that only three demographics items (i.e. the length of stay, specialization, and classification of university year) had significant differences with the student perceptions, as shown in table 1.

Table 1: Comparing means of demographics

Demographics	Comparing means of Importance		Comparing means of Performance	
	F	Sig.	F	Sig.
Gender	3.182	.075	.183	.669
Age	3.624	.058	.231	.631
Length of stay	4.844	.001	6.794	.000
Number of meals	.850	.42	1.776	.171
Specialization	12.855	.000	18.719	.000
University year	3.919	.004	3.289	.011

These results are in agreement with those of Wellings and Bibbings (2004) *study* which revealed that demographic variables (e.g. the year experience) had an influence on student perceptions. On the other hand, disagreeing with Lee *and* Leong (2004) who found that gender had no significant differences with the perception of foodservices in university dining operations.

Importance and performance of foodservice aspects

Table 2 illustrates the attribute importance ranks and scores. The survey results were presented according to the ranking of the mean scores. Most of attributes had average scores above four, indicating that these attributes were important to students. The *eight* most important attributes were [A.10], [A.11], [A.14], [A.32], [A.12], [A.06], [A.04], and [A.02]. These rankings show the salient positions of food, service, and sanitation in student perceptions regarding university residence foodservice.

The *nine* least important attributes were [A.38], [A.28], [A.26], [A.29], [A.16], [A.36], [A.33], [A.34], and [A.27]. Ambiance attributes represented seven of the nine least important attributes. This indicates that students do not expect much from the dining ambiance in university residence foodservice operation. However, it is essential to remember that the IPA technique identifies the relative, rather than absolute, levels of importance. Thus, when describing the results of importance ranking, one should not

conclude that the dining ambiance is not important to students. It is simply less important when compared to other foodservice aspects (i.e. food, service, and sanitation).

The attribute performance ranks and scores are also illustrated in table 2. The mean score of the overall performance was 2.4, indicating that university residence foodservice operation in general did not perform well. Only eight out of the 38 attributes; [A.22], [A.21], [A.35], [A.34], [A.33], [A.37], [A.10], and [A.09] did well in terms of performance. The lowest ten attributes were [A.15], [A.16], [A.13], [A.02], [A.05], [A.17], [A.04], [A.19], [A.07], and [A.20]. All of them are related to food and service aspects. These findings revealed that there is a necessity for residence foodservice operations to improve their performance as a whole, particularly in the areas of food and service which are of high importance to students.

IPA Grid

As previously mentioned in the methodology section, a total of 38 food service attributes were identified to be analyzed. The attribute mean ratings which are illustrated in table 2 and depicted in *Fig. 2* were derived from their descriptive statistics. The grand means for importance and performance were used for the placement of the axes on the IPA grid (Chu and Choi, 2000). As shown in *Fig. 2*, twenty three attributes were identified in the concentrate here quadrant, six in the keep up the good work quadrant, seven in the low priority quadrant, and two in the possible overkill quadrant.

Table 3 shows the classification of foodservice attributes distributed in the IPA grid: most food attributes (77%) were in the “concentrate here” quadrant; all service attributes were positioned in the same quadrant except [A.22], which was located in “keep up” quadrant; all sanitation attributes were located in “concentrate” here quadrant. However, the 10 ambiance attributes were distributed in the IPA grid as follows: 3 in keep up, 5 in low priority, and 2 in possible overkill. The only one attribute of management supervision was in the “low priority” quadrant.

Concentrate here quadrant

As shown in table 3 as well as *Fig. 2*, twenty three out of thirty eight attributes (nearly 60 %) fell within the “concentrate here” quadrant: [A.19], [A.17], [A.15], [A.08], [A.13], [A.07], [A.18], [A.06], [A.12], [A.14], [A.11], [A.32], [A.31], [A.23], [A.30], [A.25], [A.24], [A.03], [A.05], [A.01], [A.20], [A.02], [A.04]. *These attributes* could be classified according to the foodservice aspects into: 10 food attributes, 6 sanitation attributes, and 7 service attributes. The IPA results also, showed that the students found these attributes important, but their performances were not satisfactory. It is therefore imperative that university residence management should focus on and direct more resources to improve these attributes according to their priorities.

Table 2: Importance and performance of foodservice attributes

Rank	Attributes according to mean of importance		Attributes according to mean of performance	
1	[A.10] Providing three meals.	4.36	[A.22] Providing food on time.	3.09
2	[A.11] Healthy options.	4.28	[A.21] Serving food throughout the entire operating hours.	2.85
3	[A.14] Various drinks.	4.27	[A.35] Convenient operating hours for all students and timetable.	2.77
4	[A.32] Clean pots and dishes.	4.26	[A.34] Dining area lighting.	2.77
5	[A.12] Appropriate food temperature.	4.26	[A.33] Appropriate dining area temperature.	2.57
6	[A.06] Food freshness.	4.26	[A.37] Safety of dining area.	2.56
7	[A.04] Correcting service errors promptly.	4.26	[A.10] Providing three meals.	2.51
8	[A.02] Addressing students' problems immediately.	4.26	[A.09] Variety of food items.	2.45
9	[A.01] Employee courtesy.	4.25	[A.29] Comfortable seating while eating in the dining hall.	2.36
10	[A.20] Reliable and consistent service.	4.23	[A.25] Employee personal hygiene.	2.33
11	[A.31] Clean kitchen.	4.22	[A.28] Comfortable and easy to move in dining area.	2.33
12	[A.18] Consistently high-quality food at lunch.	4.22	[A.30] Clean dining hall.	2.32
13	[A.07] Good food taste.	4.21	[A.01] Employee courtesy.	2.26
14	[A.09] Variety of food items.	4.19	[A.27] Interior and exterior decoration of dining hall.	2.25
15	[A.23] Healthy practices in preparation and serving of food.	4.17	[A.11] Healthy options.	2.24
16	[A.13] Food presentation.	4.17	[A.12] Appropriate food temperature.	2.23
17	[A.08] Adequate amount of food.	4.17	[A.31] Clean kitchen.	2.22
18	[A.15] Attractive food items.	4.15	[A.38] Management supervision.	2.22
19	[A.05] Quick response to your needs.	4.12	[A.32] Clean pots and dishes.	2.20
20	[A.17] Consistently high-quality food at breakfast.	4.11	[A.26] Overall design of dining hall.	2.20
21	[A.03] Well-trained, competent, and experienced staff.	4.11	[A.18] Consistently high-quality food at lunch.	2.19
22	[A.19] Consistently high-quality food at dinner.	4.1	[A.24] Neat and well-dressed employees.	2.18
23	[A.22] Providing food on time.	4.09	[A.36] Visibility of food preparation area.	2.17
24	[A.30] Clean dining hall.	4.06	[A.08] Adequate amount of food.	2.16
25	[A.24] Neat and well-dressed employees.	4.05	[A.23] Healthy practices of employees regarding preparing and serving food.	2.10
26	[A.21] Serving food throughout the entire operating hours.	4.04	[A.14] Various drinks.	2.09
27	[A.35] Convenient operating hours for all students and timetable.	4.03	[A.06] Food freshness.	2.09
28	[A.25] Employee personal hygiene.	4.03	[A.03] Well-trained, competent, and experienced staff.	2.04
29	[A.37] Safety of dining area.	4.02	[A.20] Reliable and consistent service.	2.02
30	[A.38] Management supervision.	3.98	[A.07] Good food taste.	2.01
31	[A.28] Comfortable and easy to move dining area	3.98	[A.19] Consistently high-quality food at dinner.	1.97
32	[A.26] Overall design of dining hall.	3.94	[A.04] Correcting service errors promptly.	1.91
33	[A.29] Comfortable seating while eating.	3.92	[A.17] Consistently high-quality food at breakfast.	1.91
34	[A.16] Nutritional information about food items.	3.88	[A.05] Quick response to your needs.	1.88
35	[A.36] Visibility of food preparation area.	3.87	[A.02] Addressing students' problems immediately.	1.86
36	[A.33] Dining area temperature.	3.86	[A.13] Food presentation.	1.80
37	[A.34] Dining area lighting.	3.69	[A.16] Nutritional information about food items.	1.80
38	[A.27] Interior and exterior decoration of dining area.	3.69	[A.15] Attractive food items.	1.73

A.= Attribute

Table 3: Classification of foodservice attributes on the IPA quadrants

Foodservice areas/IPA quadrant	Concentrate here (23) attributes	Keep up (6) attributes	Low priority (7) attributes	Possible overkill (2) attributes
Food attributes (13)	10 attributes: [A.19] Provide consistently high-quality food at dinner; [A.17] Provide consistently high-quality food at breakfast; [A.15] Provide attractive varieties of food; [A.08] Provide the amount of food suitable for every student; [A.13] Appearance and presentation of food; [A.07] Good food taste; [A.18] Provide consistently high-quality food at lunch; [A.06] Provide fresh food; [A.12] Served food with a suitable temperature; [A.14] Diversity of provided drinks.	2 attributes: [A. 9] diversity of provided food items. [A. 10] providing three meals .	1 attribute: [A.16] Nutritional information about food items.	
Sanitation attributes (6)	6 attributes: [A.11] Healthy options (food safety); [A.32] Clean pots and dishes; [A.31] Clean kitchen; [A.23] Healthy practices of employees with regard to preparing and serving food; [A.30] Clean dining hall; [A.25] Employee personal hygiene.			
Service attributes (8)	7 attributes: [A.01] Employee courtesy; [A.02] Addressing students' problems immediately; [A.03] Well-trained, competent, and experienced staff; [A.04] Correcting service errors promptly; [A.05] Quick response to your needs; [A.20] Reliable and consistent service; [A.24] Neat and well-dressed employees.	1 attribute: [A. 22] providing food service on time.		
Ambiance attributes (10)		3 attributes: [A. 21] serving food for students throughout the entire operating hours; [A. 35] appropriateness of service operating hours; [A. 37] safety of dining area.	5 attributes: [A.28] Comfortable and easy to move in dining area; [A.26] Overall design of dining hall; [A.27] Interior and exterior decoration of dining hall; [A.29] Comfortable seating while eating in the dining hall; [A.36] Visibility of food preparation area.	2 attributes: [A.33] Appropriate dining area temperature; [A. 34] the suitable lighting of the dining room.
Management supervision (1)			1 attribute: [A.38] Management supervision.	

Keep up the good work quadrant

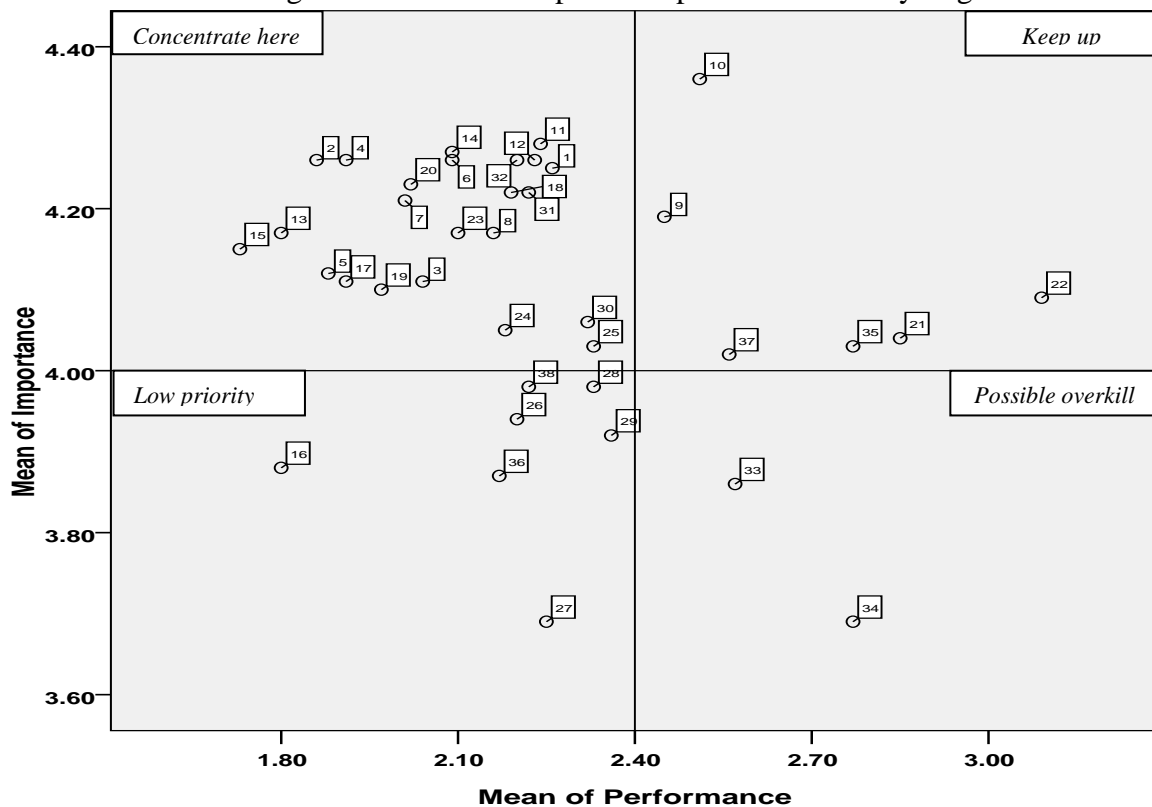
The “*keep up the good work*” quadrant depicted 6 attributes: 2 food attributes, i.e. [A. 9] and [A. 10]; 3 ambiance attributes, i.e. [A. 21], [A. 35], and [A. 37]; 1 service attribute, i.e. [A. 22]. The attributes within this quadrant were of high importance to the students and

were also of high performance. The results provided a positive feedback, and encouragement to keep their current good practice with regard to these attributes in place.

Low priority quadrant

Seven attributes were located in the “*low priority*” quadrant: one food attribute, i.e. [A.16]; five ambiance attributes, i.e. [A.28], [A.26], [A.27], [A.29], [A.36]; and the attribute of management supervision, i.e. [A.38]. These attributes were not important for the students nor did residence foodservice operations perform well on them. They may be excitement factors which greatly increase student satisfaction more than the other types of factors. Here, the university residence management has to examine these attributes to make sure that this remains true, and be aware of any changes in their importance. These attributes can be addressed in university residence long-term development strategies. They also provide a chance for potential improvement in the future. When the university residence resources are sufficient, these attributes should be improved to enhance the university residence overall image.

Figure 2: Results of importance-performance analysis grid



Possible overkill quadrant

Within the “*possible overkill*” quadrant, were two attributes: [A. 33], and [A. 34]. The results showed that the residence foodservice operations performed well but the students perceived them of low importance. Consequently, it is suggested that management should not pay more attention to improve these attributes, but rather still continues with this good practice.

Management supervision influencing foodservice aspects

A regression analysis was conducted to identify the effect of management supervision on university residence foodservice aspects, i.e. service, food, sanitation, and ambiance (see table 4). Management supervision was found to significantly affect the other aspects

[(Sanitation aspect) Co-efficient=.538, P-value=.000; (Ambiance aspect) Co-efficient=.506, P-value=.000; (Service aspect) Co-efficient=.461, P-value=.000; (Food aspect) Co-efficient=.423, P-value=.000], respectively.

It was noticed from the previous results that management supervision had the greatest impact on sanitation aspect, which emphasizes that permanent supervision is essential for safe food handling practices. It is in charge of providing safe food and also accurately instructing the staff regarding food-handling procedures (Van Hoof et al., 1996).

Table 4: Management supervision influencing university residence foodservice attributes

Model	Un-standardized Coefficients		Sig.	Model Statistics
	B	Std. Error		
Average Sanitation	.538	.028	.000	<i>F: 361.138, R2: 0.455</i>
Average Ambiance	.506	.028	.000	<i>F: 315.942, R2: 0.422</i>
Average Service	.461	.028	.000	<i>F: 270.968, R2: 0.385</i>
Average Food	.423	.025	.000	<i>F: 283.003, R2: 0.395</i>

Foodservice attributes influencing satisfaction

To explore the relationship between university residence foodservice aspects as independent variables and student satisfaction as a dependent variable, a correlation was measured. The results clearly revealed that, there were significant relationships among all these variables. Furthermore, it was clearly noticed that the service aspect achieved the highest score of correlation ($r= 0.634$, $\text{Sig.}<0.000$), whereas ambiance aspect got the lowest score ($r= 0.428$, $\text{Sig.}<0.000$).

A regression analysis was conducted to identify which foodservice aspects (i.e. service, food, sanitation, management supervision, and ambiance) affect student satisfaction, as shown in table 5. When assessing the degree of influence of each aspect on satisfaction based on the previous correlation results, only three aspects [i.e. (Service) Co-efficient=.378, P-value=.000; (Food) Co-efficient=.255, P-value=.001; (Management aspect) Co-efficient=.078, P-value=.054] were found to significantly affect satisfaction, respectively. From the regression results, it could be noticed that service had the highest impact on satisfaction. This finding concurs with the study of Yuksel and Yusel (2002), and Andaleeb and Conway (2006) which found that service was the most important aspect influencing student satisfaction. Additionally, the previous findings are in agreement with those of the IPA, where most attributes of food and service aspects were located in “concentrate here” and “keep up” quadrants. This indicates that these two aspects were the most important factors from the students’ point of view in satisfying their needs. Moreover, these results are consistent with those of Sulek and Hensley (2004), Namkung and Jang (2007), and Liu and Jang (2009) who asserted that food and service quality play an important role in affecting student satisfaction. With regard to management supervision, the aforementioned regression results do not coincide with those of IPA. However, it is important to keep in mind that the IPA approach identifies relative, rather than absolute, levels of importance. From students’ viewpoints management supervision is simply less important when compared to other aspects (e.g. food and service).

Table 5: University residence foodservice aspects influencing student satisfaction

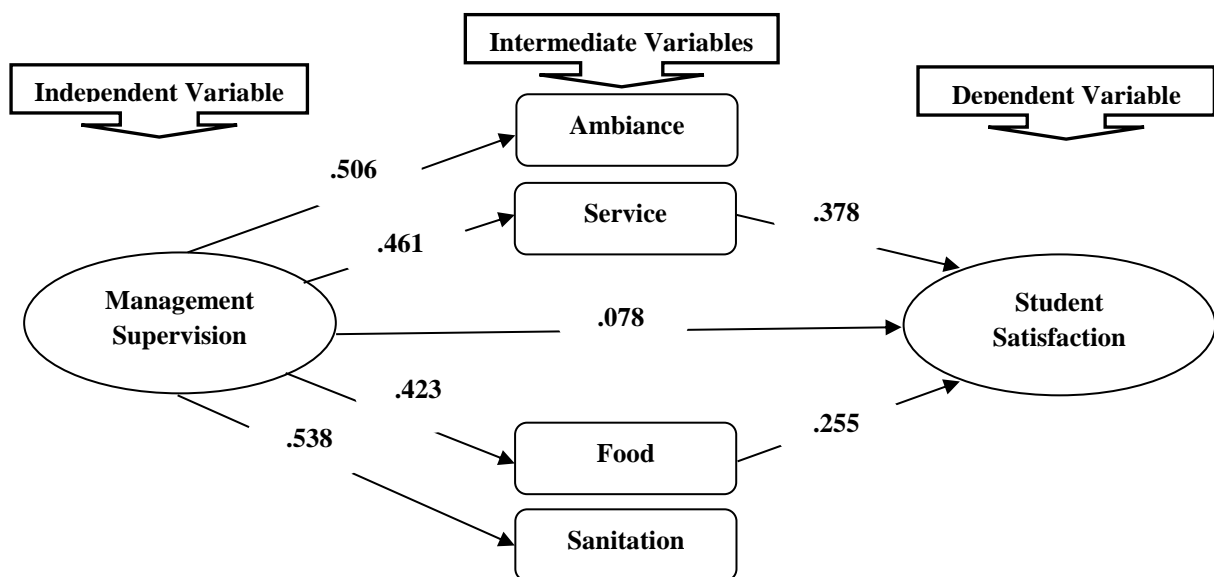
Model	Un-standardized Coefficients		Sig.	Model Statistics
	B	Std. Error		
(Constant)	.049	.102	.633	<i>F</i> : 73.108, <i>R</i> ² : 0.460
Average Service	.378	.069	.000	
Average Food	.255	.077	.001	
Average Sanitation	.113	.076	.136	
Average Management	.078	.040	.054	
Average Ambiance	.038	.062	.537	

*Regression equation can be formed as $Satisfaction = 0.049 + 0.378 Service + 0.255 Food + 0.113 Sanitation + .078 Management + 0.038 Ambiance$.

On the other hand, ambiance aspect (Co-efficient=-.038, P-value=.537) was not found to significantly affect satisfaction. These results are also in the same line with the IPA findings, where the most attributes of ambiance were located in “low priority” and “possible overkill” quadrants. Also, sanitation aspect (Co-efficient=.113, P-value=.136), was not found to significantly affect satisfaction. This finding is inconsistent with those of the IPA, where all sanitation attributes were positioned in the “Concentrate here”. This is because sanitation may play the role of basic factors (Dissatisfiers) in affecting student satisfaction. Basic factors are minimum requirements for satisfaction. Failure to accomplish the minimum requirements causes dissatisfaction, whereas meeting or exceeding them does not necessarily result in satisfaction (Fuller and Matzler, 2008). Based on the previous regression results, a model has been developed which depicts the effective factors influencing student satisfaction. It illustrates three variables: the independent variable (management supervision), the intermediate variable (foodservice aspects), and the dependent variable (student satisfaction).

As shown in Fig. 3, there are two important interpretations: management supervision significantly affects the other foodservice aspects and satisfaction; only three foodservice aspects (i.e. service; food; management supervision) significantly affect satisfaction, respectively. Moreover, it is clearly noticed that if university management increases the level of supervision, all dependent variables even satisfaction will be enhanced according to the regression equation (see table 5).

Figure 3: A proposed student satisfaction model



Conclusions and implications

This study investigated student perceptions of a public university residence foodservice and the key aspects affecting their satisfaction. The study highlighted three main findings. *First*, after analyzing foodservice aspects via IPA and the regression analysis, all sanitation attributes and 17 service and food attributes were positioned in the “*concentrate here*” quadrant. Service and food were found to significantly affect satisfaction, respectively. However, sanitation aspect was not found to significantly influence satisfaction. Sanitation may act as basic factors in affecting student satisfaction. So, the study results suggested that food, service and sanitation are three key areas where improvement efforts should be made by management of the investigated university to achieve student satisfaction.

Second, management supervision as a foodservice aspect was located in the “*low priority*” quadrant, indicating that students perceived it of low importance compared with the other aspects. However, this aspect was found to significantly affect student satisfaction as well as the other foodservice aspects, particularly the sanitation attributes.

Third, the majority of the ambiance attributes were positioned in the “*low priority*” and the “*possible overkill*” quadrants of the IPA grid. Also, ambiance aspect was not found to significantly influence satisfaction. This result indicates that customers do not expect much from the residence dining environment. On the other hand, the “*low priority*” quadrant does not necessarily signal that these attributes are unimportant. Ambiance-related attributes may be considered as excitement factors. Since excitement factors are typically unexpected by customers, they can more easily result in customer satisfaction (Fuller and Matzler, 2008).

Considering the findings of both IPA, which are descriptive in nature, and regression analysis, which are statistical in nature, this research provides a detailed description for university management to improve their residences foodservice operations. Also, the results of regression analysis are generally consistent with those of the IPA. This reveals the importance and validity of IPA grid as a measuring tool in assessing satisfaction.

In conclusion, management of the investigated university could have two important solutions to the underperformance of residence foodservice operations. *First*, it should pay special attention and provide permanent top-management support in relation to supervision. *Second*, it should concentrate on the food and service aspects since they were located in the “*concentrate here*” quadrant as well as they were found to significantly affect satisfaction. Management should reasonably distribute its resources based on the importance level of each aspect as well as it should be aware of any changes of the attributes moving from one quadrant to another to keep up-to-date with their student needs. Finally, the results of this study are not without limitations. IPA results here should be explained carefully. Previous studies have indicated that at least two IPA assumptions might be questionable: (a) performance and importance attributes are not independent variables. Importance attributes can be interpreted as a function of performance. This condition may affect the attribute distribution blueprint in the IPA grid, thus partly influencing IPA managerial recommendations; (b) the relationship between performance attributes and overall satisfaction may be irregular (Matzler *et al.*, 2004). If that is the case, the importance of basic factors is going to be overrated, whereas the importance of excitement factors tends to be underestimated (Vavra, 1997).

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