Self-ordering systems and its Impact on Customer Satisfaction in the Food and Beverage (F&B) Sector: Findings from the Customer Satisfaction Index of Singapore

Introduction

As technology becomes increasingly pervasive in Singapore, automation has become the norm across many industries. This trend has led to the rise of adoption of self-service technologies (SST) in the traditionally manpower-intensive service service sector and has disrupted the way consumers may view "service", as compared to a decade or two ago.

Given the rising popularity of SST in Singapore's retail and F&B sectors, the Institute of Service Excellence's Chen Yongchang and Bertram Goh delve deeper into this topic, attempting to shed more light on the adoption rate and impact of SST implementation.

Overview of Study

Past literature on self-service technologies (SST) suggests its ability to standardise service delivery, reduce labor cost, and expand service delivery options (Curran & Meuter, 2005). Numerous research have also looked at drivers of their acceptance, usage intentions/behavior, and their impact on customer satisfaction (Blut, Wang, & Schoefer, 2016).

In Singapore, SST in the form of ***self-ordering technologies such as kiosks and tablets***, and ***websites and mobile apps***, have been increasingly adopted by F&B and Retail companies in Singapore to reduce manpower usage for the sector, and address competitive pressures from e-commerce. These companies tend to be concerned about the willingness of customers to use these technologies as well as its impact on perception of service quality and customer satisfaction.

Drawing upon data from the Customer Satisfaction Index of Singapore (CSISG), a national face-to-face study which measures customer satisfaction across a wide range of industries, this study airms to achieve the following objectives:

- Provide empirical evidence on the current state of SST adoption and its drivers in Singapore.
- Explore the usage and impact of SST on satisfaction across a broad range of traditional brick-and-mortar service industries (i.e. Retail and F&B sectors)
- Explore both preferences, and customer characteristics, that impact the preference for the use of SST, in the manpower intensive F&B industry.

Key Findings

(A) Usage & Preference

Usage of SST remains low:

- Supermarkets Website/App (15.2%±2.2%)
- Department Store Website/App (8.7%±1.3%)
- Fashion Apparel Website/App (4.7%±1.7%)
- Supermarkets Self-checkout tech (17.3%±2.3%)
- Fast Food Self-order tech (8.9%±2.3%).

Preference for using F&B onsite SST remains low and generally heterogeneously distributed:

- Fast Food (20.6%±3.2%)
- Café & Coffee Houses (16.1%±3.6%)
- Snacks Bar & Food Kiosks (14.7%±4.0%)
- Restaurants (6.3%±1.0%).

(B) Impact of SST

Impact of SST usage varies

- Positive impact only for Department Store and Supermarkets.
- No statistically significant impact on Fast Food and Fashion Apparel.

Younger F&B Customers More likely to Prefer Using SST for ordering

Across the 4 F&B sub-sectors, younger customers were more likely to prefer using SST.

SST moderates the effect of Perceived Service Quality on Customer Satisfaction for some sub-sectors

For Department Stores and Supermarkets, Customer Satisfaction tends to be higher for lower levels of Perceived Service Quality, for Website/App users, as compared to non-users.

Implications and Points for Discussion

The following are some implications of and points of discussion pertaining to SST adoption:

- Despite benefits of SST, customer adoption may vary across industries, with **locals and younger customers** more likely to use them.
- There appears to be limited evidence for a negative impact of SST on customer satisfaction.
- Moderating effect of SST on some Retail sub-sectors suggests attempt in providing multiple channels for customers by some companies helps to improve customer satisfaction, especially for low levels of service quality.
- More research potentially needed to understand the moderation effect. Potentially, the effect could be due to either a choice effect due to **channel variety**, or a **substitution effec**t, whereby customers who experienced poorer onsite service quality, are using the SSTs for a better experience.

Methodology

Tables 1 and 2 (below) provides the descriptive statistics on our variables of interest.

Table 1: Sample Sizes

Sector	Sub-Sectors	Local	Tourist	Total
Retail	Departmental Stores	1220	580	1800
	Supermarkets	1000	0	1000
	Fashion Apparels	420	180	600
	Sub-Total	2640	760	3400
Food & Beverage	Restaurant	1385	715	2100
	Fast Food Restaurant	380	220	600
	Cafes, Coffee House	240	160	400
	Snack Bars, Food Kiosks	195	105	300
	Sub-Total	2200	1200	3400
Total		**4840**	**1960**	**6800**

Table 2: Descriptive Statistics

	Retail			F&B		
Variables	Mean / Percentage	Standard Deviation	Cronbach's Alpha	Mean / Percentage	Standard Deviation	Cronbach's Alpha
Customer Satisfaction (LV)	**73.08**	**11.52**	**0.86**	**73.65**	**13.38**	**0.88**
Overall Customer Satisfaction	7.70	1.10		7.76	1.25	
Confirmation to Expectations	7.48	1.17		7.53	1.35	
Close to ideal product/service	7.52	1.25		7.54	1.42	
Percieved Service Quality (LV)	**75.98**	**11.76**	**0.80**	**76.14**	**13.88**	**0.88**
Overall Service Quality	7.86	1.21		7.91	1.35	
Customization of Service	7.79	1.22		7.78	1.37	
Service Reliability	7.87	1.33		7.87	1.48	
Customer Expectations (LV)	**74.27**	**11.70**	**0.85**	**74.73**	**10.93**	**0.83**
Expectations about overall quality	7.63	1.09		7.69	1.03	
Expectations about customization	7.74	1.18		7.80	1.15	
Expectations about reliability	7.69	1.33		7.69	1.25	
Perceived Value (LV)	**76.26**	**12.29**	**0.69**	**75.57**	**14.31**	**0.79**
Price given quality	7.72	1.24		7.76	1.37	
Quality given price	8.02	1.30		7.85	1.47	

Percieved Product Quality (LV)	**74.97**	**11.57**	**0.82**	**75.37**	**14.04**	**0.90**
Overall Product Quality	7.77	1.13		7.82	1.30	
Product Customization	7.73	1.30		7.71	1.50	
Product Reliability	7.74	1.24		7.81	1.38	
Age	40.38	11.96		39.04	11.04	
Proportion of Tourists	22.4%			35.3%		
Proportion of Females	52.0%			49.1%		

Note: LV refer to latent variables derived from Fornell et al's (1996) methodology. Component variables of LV in italics.

Sampling Frame:

Nationally representative sample using a stratified random sampling approach based on local and tourist brand interaction incidence. Brands with published scores were set at N=50-200 samples per brand. Statistical weights based the incidence of customer interactions were applied to ensure findings are nationally representative.

CSISG Data:

Data was based on face-to-face interviews using (1) randomized door-to-door for Singaporean and Permanent residents, and (2) street interviews at Changi Airport for Tourists.

Data Collection period:

Retail (Jan to April 2019), F&B (July to Oct 2018)

Variables of Interest:

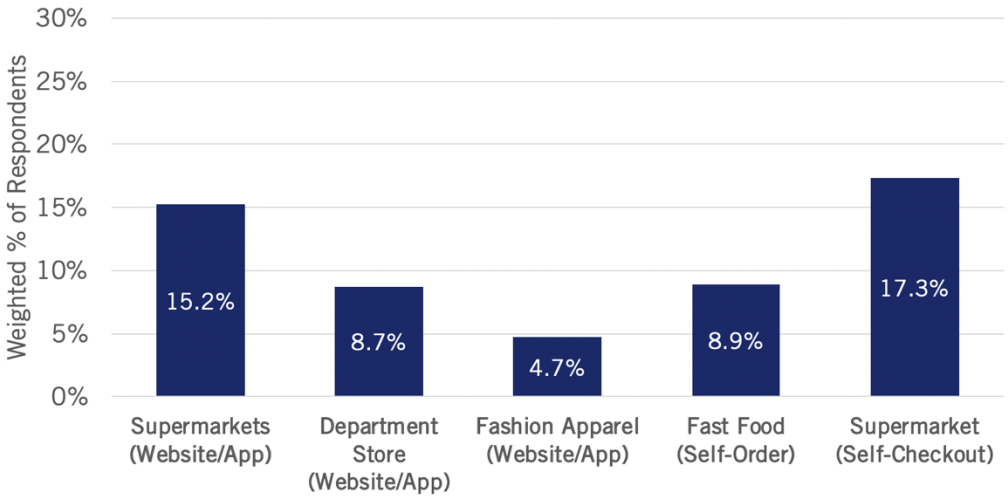
- **Customer Satisfaction & Antecedents based on Fornell et al (1996)**: Customer satisfaction, Perceived Service Quality, Perceived Product Quality, Customer Expectations, Perceived Value.
- **Demographics**: Age, Gender, Locals and Tourist segment.
- **Independent Variables:** Website/Online usage (For Retail), Self-Ordering technology preference (For F&B), and Frequent SST usage (For Supermarkets and Fast Food).

Results

Low Usage & Preference for SST

- Figure 1 and Figure 2 (below), illustrates the weighted proportions of SST usage and preference across the different sub-sectors.
- Proportion of customers who shopped/patronized both at the traditional brick-and-mortar stores and used their SST (i.e. Mobile/app for Retail sub-sectors, and Self-service tech for Fast Food and Supermarkets) was low, with proportions ranging from 4.7% to 17.3%.

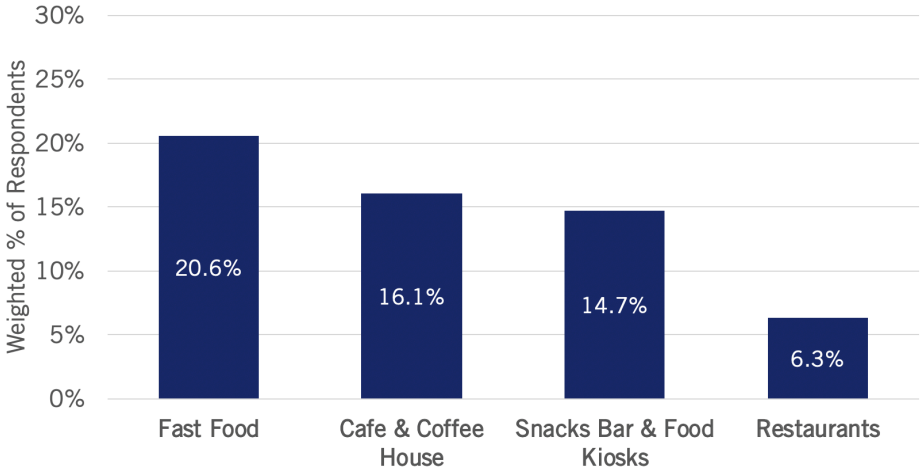
Low Usage of SSTs Across Sub-Sectors
(Figure 1: Use of Website/App and Self-Service Tech)



Note: (1) Website/App proportions were based on customers who had used the respective company's website or mobile app in the last 3 months. Self-Order and Self-Check out proportions were based on customers who frequently use self-order technologies such as tablets or kiosks for checkout or ordering. Data on use of SST in other F&B sub-sectors not collected during survey. (2) Due to oversampling for specific companies, survey weights, based on customer interactions using data from a separate nationally representative incidence study on locals and tourists was applied. Findings do not differ if unweighted. (3) No tourists were surveyed for Supermarkets.

F&B Sector: Preference for Using SST Remains Low and Differs Across Sub-Sectors

(Figure 2: Preference to use Self-Ordering Tech if given a choice)



Note: Due to oversampling for specific companies, survey weights, based on customer interactions using data from a separate nationally representative incidence study on locals and tourists was applied. Findings do not differ if unweighted.

Predictors of Preference for F&B Self-Ordering Technology

Referring to Table 3 below, logistic regression analysis was utilised for this analysis.

Table 3: Logistics Regression on Preference for Using F&B Self-Ordering Technology

	Restaurants	Fast Food	Snacks Bar & Food Kiosks	Cafe & Coffee House
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Service Quality Attributes				
Overall Service Quality	1.31 *	1.38 *	0.72	0.83
Customization of Service	1.11	1.09	1.09	0.72
Service Reliability	0.84	1.14	0.85	1.37
Customer Satisfaction & Antecedents				
Customer Expectations	1.01	0.99	0.91 ***	0.98
Perceived Product Quality	0.97	0.98	1.00	0.99
Perceived Value	0.97 *	1.00	1.07 *	1.04
Customer Satisfaction	1.03	0.97	1.05	0.99
Demographics				
Age	0.91 ***	0.93 ***	0.96 *	0.94 ***
Gender (Female)	1.18	0.89	1.51	1.33
Local-Tourist Segment (Tourist)	0.44 ***	0.56 **	0.51	0.59
Intercept	3.61	6.24	2.17	8.57
R^2 (Nagelkerke)	0.15	0.15	0.19	0.14
Model Chi-squared	119.67 ***	60.48 ***	34.63 ***	34.68
Hosmer & Lemeshow test	23.38 **	9.15	10.68	7.85
Observations	2100	600	300	400

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Note: (1) Due to oversampling for specific companies, survey weights, based on customer interactions using data from a separate nationally representative incidence study on locals and tourists was applied. (2) Findings were generally similar without survey weights. However if unweighted, (1) for Fast Food's Overall Service Quality and Local Tourist Segment variables, and (2) Snacks Bar & Food Kiosk's Perceived Value variable, were not statistically significant.

Younger customers

Age (OR: 0.91 to 0.96) was a consistent predictor across the F&B sub-sectors.

Locals & Overall Service Quality

For Restaurants and Fast Food, Tourists were less likely to prefer using SST (OR: 0.44 and 0.56 respectively). Interestingly, Overall Service Quality was associated with higher preference for SST (OR: 1.31 and 1.38 respectively).

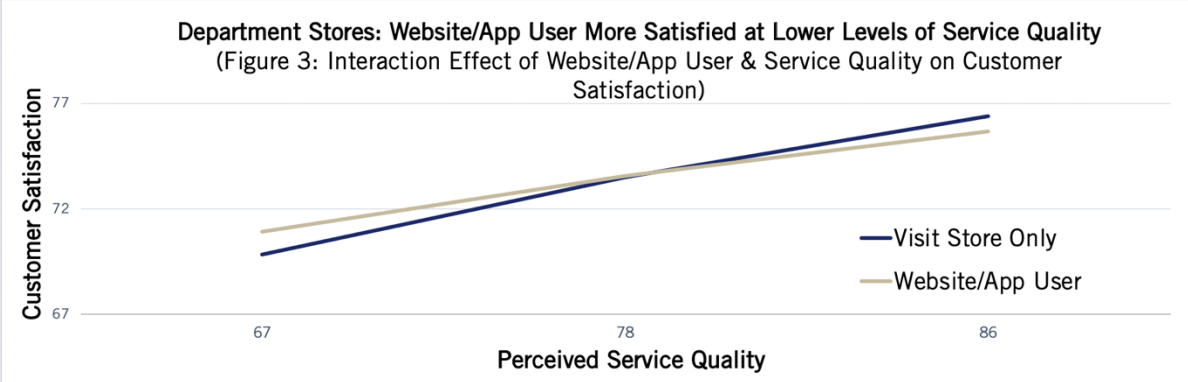
Impact of SST on Customer Satisfaction & Service Quality [Refer to Table 4, Figure 3 & 4 below]:

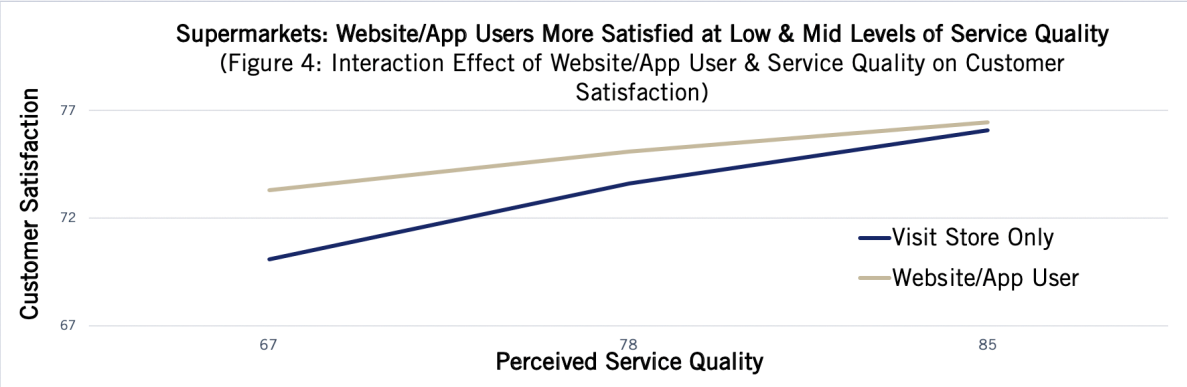
Table 4: Linear Regression on Customer Satisfaction

	Fashion Apparel		Department Store		Supermarkets		Fast Food	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	β	β	β	β	β	β	β	β
SST User								
Website/App User	-2.19	-1.63	-0.27	8.11*	0.68	17.03**		
Onsite SST User					0.40	5.37	-0.86	-1.32
Interaction Terms								
Website/App User x Perceived Service Quality		-0.01		-0.11*		-0.20**		
Onsite SST User x Perceived Service Quality						-0.06		0.01
Demographics								
Gender	-0.08	-0.08	-0.48*	-0.47*	-0.24	-0.23	0.17	0.16
Age	-0.01	-0.01	-0.01	-0.01	0.05***	0.05***	-0.01	-0.01
Local-Tourist Segment	-0.43	-0.43	1.12***	1.11***			0.53	0.53
Antecedents of Customer Satisfaction								
Customer Expectations	0.24***	0.24***	0.18***	0.18***	0.24***	0.23***	0.07**	0.07**
Perceived Value	0.07**	0.07**	0.09***	0.09***	0.07**	0.07**	0.11**	0.10**
Perceived Service Quality	0.30***	0.30***	0.34***	0.35***	0.31***	0.34***	0.39***	0.39***
Perceived Product Quality	0.38***	0.38***	0.37***	0.37***	0.32***	0.31***	0.41***	0.41***
Intercept	0.61	0.60	-0.90	-1.13	0.81	-0.29	0.25	0.28
Adjusted R^2	0.83	0.83	0.82	0.82	0.75	0.75	0.86	0.86
F-value	362.5 1***	321.6 9***	1054.5 7***	939.7 4***	378.1 6***	306.8 8***	471.9 0***	418.7 6
Observations	600	600	1800	1800	1000	1000	600	600

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Note: (1) Analysis for Model 1 was based on the variables of interest, while Model 2 includes interaction terms for SST usage and Service Quality. (2 Due to oversampling for specific companies, survey weights, based on customer interactions using data from a separate nationally representative incidence study on locals and tourists was applied. Findings do not differ if unweighted. (3) For Supermarket, Model 2 results did not differ even when Interaction terms were included separately.





- **Regression Models**: Two multiple linear regression models on Customer Satisfaction was done. Model 1 explored the direct effect of SST usage on Customer Satisfaction. Model 2 explored the potential impact of SSTs on Perceived Service Quality, by analysing how it moderates the latter's impact on Customer Satisfaction.
- **Department Store and Supermarket Website/App User More Satisfied:** Statistically significant positive relationship between users of both sub-sectors Website/App and Customer Satisfaction was observed.
- **No Negative Impact on Supermarkets and Fast Food**: Frequent use of onsite SST such as self-checkout kiosks, self-ordering technology, was not significantly related to Customer Satisfaction.
- **Moderation Effect on Perceived Service Quality & Customer Satisfaction:** Use of Website/App was found to positively moderate the effect of Perceived Service Quality on Customer Satisfaction, especially at lower levels of Perceived Service Quality.

Limitations of Study

Inclusion of Tourists:
Usage proportions included the tourist segment which tend to not use SSTs. When only the locals segment was analyzed, usage of SST remains low with proportions ranging between 10.6% to 17.3%.

Use of statistical weights:
Due to oversampling for popular brands, statistically weights were applied. Without these weights, findings were generally similar.

Cross-sectional design:
Given the cross-sectional design, it should be noted that findings may change over time based on how companies adopt, deploy SSTs.

Data limitations: Due to survey constraints relating to questionnaire length, usage and preference questions were not consistently available for all the sub-sectors. Data on the quality of SST experience was also not available. Thus, findings were unable to fully control for SST quality. However, as statistical weights based on customers interactions were applied, the results are at least generalizable to the general perception of SSTs for these sub-sectors.

References

- Blut, M., Wang, C., & Schoefer, K. (2016). Factors Influencing the Acceptance of Self-Service Technologies: A Meta-Analysis. *Journal of Service Research*, *19*(4), 396–416. https://doi.org/10.1177/1094670516662352

- Curran, J. M., & Meuter, M. L. (2005). Self-service technology adoption: comparing three technologies. *Journal of Services Marketing*, *19*(2), 12.

- Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J., & Bryant, B. E. (1996). The American Customer Satisfaction Index: Nature, Purpose, and Findings. *Journal of Marketing*, *60*(4), 7. https://doi.org/10.2307/1251898