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An Empirical Study of the Feasibility of Introducing the Mumbai Dabbawala Food Delivery System in Bangalore

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Abstract

Life style diseases like diabetes and hypertension are becoming rampant in India. Lack of physical exercise, sedentary life style and increased reliance on food cooked outside has only aggravated the problem. Bangalore has also earned the dubious distinction as the diabetes capital of India. This paper has attempted to study the feasibility of introducing the famed food delivery service of Mumbai that is popularly known as "Mumbai Dabbawalas" in Bangalore. The dabbawala service has endured for more than a century despite challenges galore. The winds of globalization may have slightly dented the popularity of this service but the never-say-die spirit of the food delivery men of Mumbai has carried them through. The delivery model of the Mumbai dabbawalas has stood the test of time. The service is delivered in an environment friendly manner. Past attempts at replicating the service in other cities has resulted in failure. One of the reasons for the popularity of the service has been its ability to deliver food on time and this has to be attributed to the local suburban train services in Mumbai that are well-known for their reliability. An empirical study was conducted to understand the preferences of consumers in Bangalore in opting for a similar service like the Mumbai dabbawalas. The results are positive and there is an opportunity for replicating the service in Bangalore by innovatively tweaking the delivery model. Taste, hygiene, nutrition and timely delivery were the primary attributes that consumers look for in a service that delivers home cooked food. Technology can also be gainfully employed to improve last mile delivery of the service. The paper makes recommendations about the changes that need to be made in the food delivery model to make it more fit for purpose for Bangalore.

Keywords: Green Logistics, Jugaad Innovation Technology, Mumbai Dabbawalas, Quality, Service Delivery Excellence, Six Sigma

1. Introduction

The famed food delivery men of Mumbai popularly called as 'Mumbai Dabbawalas' have become globally renowned after an article on them was published in Harvard Business Review. Later on, the visits by Prince Charles and Richard Branson (of Virgin Atlantic Airways) to India to meet them made their popularity soar. Their delivery model has sustained for more than 130 years and their delivery standards were found to be better than six sigma level of excellence. The food delivery men make only one error in 6 million transactions.

The dabbawalas adopt green logistics measures to deliver what the customer wants and believe that service to customers is akin to serving God. They have a strong sense of community orientation and the simplicity of their operations has made them endure for so long. However, the sweeping changes in India post-globalization has somewhat dented the demand for their services. Growing urbanization, influence of Western culture, services led industrialization and high levels of disposable incomes have made people opt for a wider variety of food services available today. The Mumbai Dabbawala system has been difficult to replicate in other cities in India despite attempts to do so.

There is growing awareness about health concerns resulting from incessant consumption of junk food. Though delivery of food through apps has become a

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popular mode of ordering food in Bangalore, the problem with these services is that they deliver food cooked in restaurants/ hotels which may not be healthy. There is no match for food cooked in home with proper care and caution. Sedentary lifestyles, unhealthy eating habits, stress and lack of physical exercise have led to the onslaught of life style diseases even among the younger generation. The time is ripe for introducing a food delivery service that can deliver food cooked at home.

2. A Brief History of Mumbai Dabbawala Operations

The operations commenced in 1890 by a group of people from the same ethnic background in Pune. The operations are characterized by cohesive community bonds and can be compared to a modern guild where work and social identity, devotion and economic gain and mutual aid and shared goals are indistinguishable from one another[19].

Havji Bacche, a young man from Pune entered Mumbai in the late 1880s. A Parsi banker employed Bacche to go to his home in Grant Road, Mumbai, collect his tiffin and deliver it to his office in Ballard Pier. It was 1890 when the system started when the British were colonizing India. Parsee women began cooking food as a business like a canteen. Unskilled workers could be found at any cross roads, sitting there with their top is or hats on. One day a woman asked one of them to deliver food and he willingly agreed. He started taking 20-25 tiffins from Girgaon to VT station[19]. Bacche decided to recruit his fellow villagers for the delivery service in pursuit of creating an organized working group. Since then the system and the business model both have endured.

3. Organisational Structure of Dabbawalas

The Mumbai dabbawalas are globally renowned as food delivery couriers who have been able to achieve six sigma standards in their service delivery. The dabbawalas have a simple and flat organization structure, clearly delegated lines of authority, great team work and an amazing sense of resilience. There are three hierarchies of authority and a decentralized structure comprising 5000 workers and 800 mukadams. There is an executive committee that is involved in setting the agenda, administering welfare activities and resolve conflicts. They believe that - No customer should go without food. The time table of the railway system and the common delivery deadline for the tiffins include a natural clock speed into the delivery operations. Their meticulous timing and coordinated team work contribute to their success[3].

The hierarchical levels are dabbawala, a mukadam, a director, treasurer, secretary and President. The second line of operations is co-ordinated by over 800 mukadams who supervise the tiffin route as far as the final delivery. The mukadam participates in the recruitment of new dabbawalas assessing their suitability by taking into consideration both their reputation and their shared origins with other members of the organisation. Forming a culturally homogeneous group allows members to identify with a shared religious and historical tradition[19].

Each area of Mumbai served by the dabbawalas has a director. The areas are defined in relation to a railway station. The directors are in contact with one another and ensure that there are no problems in distribution. They don't have an office, but work on trains, station platforms, dabba handover areas, places where organizational issues may arise[19].

The team members have slack capacity. Substitutability among the members in a team is easy. Flexible manpower deployment at the destination ensures operational accuracy. More than one team operating in an originating train station ensures internal competition and operational efficiency[18]. Work place conditions are enhanced through mentorship and trust[16].

4. Service Delivery Model

Supply chain is an integrative process used to create and sustain competitive advantage based on the delivery to customers of basic and unexpected services[4]. Proper matching of supply with demand coupled with a reliable logistics system has been the hallmark of Mumbai dabbawalas[2].

Hub and Spoke model is used for distribution operations of the food delivery service. The logistics network is a combination of milkman route, hub to hub transfer and hub to spoke distribution. The operations employ a judicious mix of transportation economics. At the collection point, it is a milk man route structure. This, supported by a hub-hub transfer to handle large volumes, reduces operational cost. At the destination it is

hub-to-spoke to ensure response time and handle volume flexibility. The rail infrastructure ensures flexibility and lower cost of operation[16]. There is perfect symmetry in the reverse logistics operation[18, 3].

On an average, each dabbawala is responsible for collecting 30-35 dabbas, the number depending on personal ability to memorize customer addresses and the physical strength for carrying the tiffin baskets. Dabbas have to be loaded quickly in the 30 seconds the train stops on the platform. There are several strategic nodes near railway stations that serve as main centers for final sorting. Mukadam supervises the efficient coordination of the delivery (Roncaglia, 2013).

The third stage is the final delivery from the strategic collection point – the cooked lunch is taken to the place of work of the "receiver-customer" at about 12.30 pm. The tension gradually eases and the dabbawalas can rest, eat their lunch and lastly prepare to make the journey back following a circular route that begins and ends in the same way every day of the week except Sunday[19].

To save time, the delivery of the lunch boxes is consolidated at the floor level at the consumer location. The customers also participate in the last step of the lunch box delivery process and also in the initial step. Information on collection route is known to every other member in the team and so exigencies are managed well[18]. The dabbawala operational performance measures are real time, transactions based. Every transaction is monitored in terms of its collection, transportation and delivery. Periodic revenue collection and volume-based employee productivity ensure a model that is self-corrective[18] Flexibility is the hall mark of the operations.

The dabbawalas operations also signify innovative entrepreneurship[13]. This innovation has spanned the entire value chain of Mumbai dabbawala operations. The Mumbai dabbawala business model is an epitome of simplicity, efficiency and dedication. The dabbawalas have a mission to serve the society driven by their entrepreneurial instincts and this is what acts as drivers of their performance[8]. These entrepreneurs have unintentionally internalized supply chain management [19].

Jugaad innovation is a type of innovation that helps in dealing with economic and resource constraints in an efficient manner. The delivery model of Mumbai dabbawalas exemplifies a classic example of Jugaad which is a low cost service innovation model[15, 19, 20].

The dabbawalas' elegant logistics system involves 25 km of public transport and 10 km of foot work involving multiple transfer points. The dabbawalas use the rail network very effectively by employing simple, straight rules mostly north-south and limit sorting to a few central points. This is the key to the dabbawalas' efficiency and success[8, 16]. The dabbawala services can also be cited as an example of green logistics services[6, 19] that demonstrate a high level of technical efficiency[8].

5. Unique Coding System

Though the dabba may change hands as many as six times, it is this coding system that is easily deciphered by the illiterate dabbawalas that makes the system flawless and ensures seamless movement of dabb[3]. The system limits the routing and sorting to a few central points. A simple colour code determines not only packet routing but packet prioritizing as lunches travel from train to bicycle to foot. The process is united at the delivery end though it is competitive at the customer's end[8].

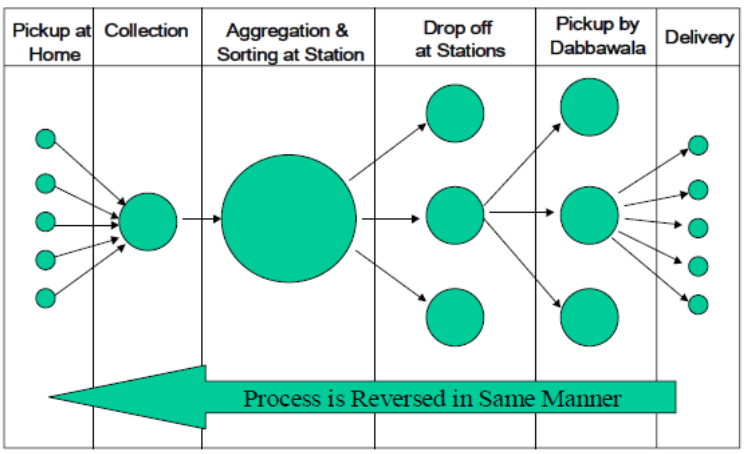

Figure 1. The delivery model of Mumbai dabbawalas[16].

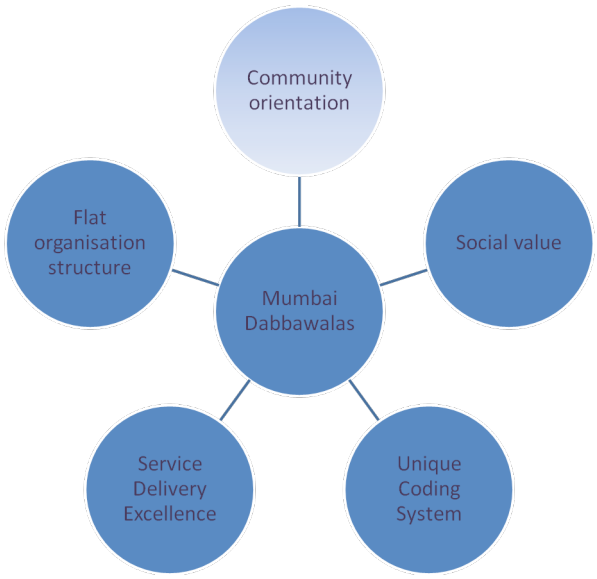

Figure 2. Unique Features of the Dabbawalas Business Model.

6. Spiritual Values in Business

The dabbawalas combine spiritual values in business. The varkarisamparadaya way (of which the dabbawalas are ardent followers) is to live, earn and work correctly. These delivery men resolutely believe in eschewing illegal means to earn money. The dabbawalas enjoy their work, share a unique sense of bonding with their fellow workers and treat their work as worship. They are able to communicate in their own language to address their business needs. Despite the hard labour, there are lower levels of stress (Menon et al, 2012) (Krishnan, 2014). They are also not ambitious. They live by simple rules characterized by lack of avarice. The dabbawala brand has become iconic due to the networked world that we live in today (Pathak, 2010).

7. Sustainability of Mumbai Dabbawalas

A sustainable enterprise is one that is aligned and co exists with society, the environment and financial opportunities in the market place through models and systems of strategy, leadership, innovation and[16] Use of a modified network framework combined with the entrepreneurial spirit of Mumbai dabbawalas has led to sustainability of the dabbawalas operations[11] Systems theory calls for an integrated approach to technological innovations – a system is a whole that can't be taken apart without loss of its essential characteristics and hence must be studied as a whole[1] Without the coding system, the delivery risks get heightened. In the absence of a flexible operational model the dabbawalas system would have been relegated to the pages of history.

Their community orientation has a great role to play in their sustainability. Their passion for delivering food to the customers, treating the service akin to service to God and their logistics agility are exemplary. The dabbawalas have managed to withstand the market pressures resulting due to structural changes in India's economy after globalization. Efficient inner organization, trust, loyalty, common ownership and equitable share of wages have played a role in the success of the Mumbai dabbawala operation[9].

In the bottom of the pyramid environment, the focus has to be on the actors who co-create services with local communities to deliver strategic value[5]. Haji Bacche who conceptualized the dabba delivery model did this serendipitously.

In 1998, the American magazine Forbes conducted a study of the dabbawalas service and awarded the organisation a six sigma with a 99.9999% accuracy rate[19]. Less than 6 errors are reported in 13 million transactions[18]. Their core competency is on-time, cost effective and reliable delivery services[3,9,16].

8. Research Methodology

This is an empirical paper where a survey has been conducted using the questionnaire method to understand the customer preferences for a food delivery system in Bangalore. Based on an exhaustive review of literature, the critical success factors for the Mumbai dabbawala operations have been identified. The challenges faced by the dabbawalas in managing their day-to-day operations have been documented. The features of their service that are unique have also been identified. Based on arrival of research objectives and formulation of research questions, hypothesis has been formulated and the same has been tested empirically. Based on the empirical study, suggestions/ recommendations have been proposed. The research design employed is a causal research design and convenience sampling method has been used.

9. Research Objectives

- To conduct an empirical study to study the feasibility of introducing the famed Mumbai dabbawala services in Bangalore.
- To investigate the preferences of people with reference to consumption of home cooked food.
- To identify differences relating to gender with regard to various dimensions of consumption of food and the food delivery system.
- Based on the feasibility study, to propose a business model for introducing the dabbawala services in Bangalore.

10. Research Questions

- How can the service delivery model of Mumbai dabbawalas be replicated in a growing city like Bangalore?
- What are the critical success factors for the proposed food delivery model?
- What are the factors that motivate people to consume home cooked food in comparison to food prepared in hotels and restaurants?
- Which attributes of the food delivery model are more appealing to the customer?

11. Data Analysis

Empirical study conducted with the objective of exploring the option of introducing a dabbawala service in Bangalore similar to the Mumbai dabbawala food delivery service. While the overall objective of this research was to explore the possibility whether the famed dabbawala food delivery system of Mumbai can be replicated in Bangalore, this goal was further divided into a number of sub-goals to have a granular understanding of consumer preferences.

- To evaluate the differences in the awareness levels about the famed dabbawala services of Mumbai among the respondents in Bangalore based on gender.
- To explore the reasons why people prefer home cooked food.
- To seek the opinion of respondents about food cooked outside and sold.
- To seek the opinion of respondents about their preference for delivery of home-cooked tiffins and to identify if the preferences were dependent on gender.
- To identify the price levels for delivery of home cooked food and additionally evaluate the gender-wise differences in the price levels.
- To estimate the probability of success in replicating the dabbawala food delivery model in Bangalore.
- To identify the attributes of delivery of home-made food that appealed to the consumer.

A total of 216 respondents took part in the survey. Of these, 53 were female respondents and 163 were male respondents. Convenience sampling method was adopted. The response rate was 100% as hard copies of questionnaires were given to the respondents personally and collected individually.

11.1. Awareness about the Services

87% of females are aware about the Mumbai dabbawala services, while 91% of males are aware of the services. (Table1). To find out awareness about the Mumbai dabbawala services is independent of gender, a chi-square test was conducted.Null Hypothesis: Males and females are equally unaware about the Mumbai dabbawala services. Alternate Hypothesis: There is a difference in the awareness levels about the Mumbai dabbawala services based on gender.

The chi-square value calculated: 0.97527. At 5% level of significance, the value of chi square observed from the Tables is 3.841 (1 degree of freedom). As calculated value of chi square is less than the tabular value, null hypothesis is accepted. Thus, the awareness about Mumbai dabbawalas is independent of gender.

Table 1. Metrics for service supply chain performance evaluation

	Females	Males	Total
Aware	46	149	195
Unaware	7	14	21
Total	**53**	**163**	**216**

11.2 Reasons for Preferring Home Cooked Food (Table 2)

Among males, 75% preferred home cooked food as it was tasty, healthy and nutritious. 20% of males preferred home cooked food due to the hygiene factor. Among the females, 58% preferred home cooked food due to its taste and 41% of females voted for hygiene.

Table 2. Reasons for Preferring Home Cooked Food

	Males	%	Females	%
Tasty, healthy, nutritious	123	75.46%	31	58.49%
Less oily	4	2.45%	0	0
Less spicy	0	0 %	0	0
Prepared in a hygienic manner	33	20.25%	22	41.51%
Any other reason	3	1.84%	0	0
Total	**163**		53	

11.3 Preference for Consuming Homemade Food (Table 3)

A 6-item Likert scale was used for understanding the consumer preferences for homemade food. 90.6% of females show preference for consuming homemade food. 89.2% of males show preference for consuming homemade food.

Table 3. Preference for Consuming Homemade Food

Sex	Total Score	Average Score	Maximum Score	%
Females	1440	27.16	30	90.6%
Males	4363	26.77	30	89.22%

11.4 Opinion about Food Cooked In Hotels and Restaurants (Table 4)

26.38% males felt that hotel food offered variety while 32 % females felt so.

Table 4. Opinion about Food Cooked In Hotels and Restaurants

	Males	Females
Tasty	12	2
Spicy and Oily	13	8
Expensive	19	4
Lots of variety	43	17
Easily available/ saves time	21	4
All the above	55	18
Total	**163**	**53**

11.5 Frequency of Eating Hotel Food (Table 5)

48% males ate hotel food once a week while 26% females ate hotel food once a week.

Table 5. Frequency of Eating Hotel Food

	Males	Females
Daily	41	8
Once a week	79	14
Once in 2 weeks	25	16
Once a month	13	12
Once in 3 months	3	2
Once in 6 months	0	0
Once a year	1	0
Never eat hotel food	1	1

11.6 Interest in Home-Made Tiffins (Table 6)

41% males are interested in homemade tiffin unconditionally. 45% females are interested in homemade tiffin unconditionally. 20% males indicated their willingness to consume homemade tiffin based on price. 17% females indicated their willingness to consume homemade tiffin based on price. 26% males gave importance to taste while 32% females relied on taste while deciding to opt for homemade tiffin.

Table 6. Interest in Home-Made Tiffins

	Males	Females
Yes	67	24
No	21	3
Depends on Price	33	9
Depends on Taste	42	17
	163	53

11.7 To Test Whether The Preferences For Homemade Tiffin's Was Dependent On Sex, A Chi Square Test Was Conducted. (Table 7)

Null Hypothesis: There is no difference in the preference for home made tiffins based on sex.

Alternate Hypothesis: Males and females have different preferences when it comes to ordering homemade tiffins.

(Only the options "Yes" and "No" to the question were considered).

The calculated value of chi square was 2.0288 which is lower than the tabular value of 3.841 (at 5% level of significance, 1 degree of freedom). Therefore the Null Hypothesis is accepted.

Men and women have equal preferences for home made tiffins.

Table 7. Whether Preference for Home-Made Food Was Dependent On Gender

	Males	Females	Total
Yes	67	24	91
No	21	3	24
Total	**88**	**27**	**115**

11.8 Price That Respondents Are Willing To Pay For Home Cooked Food

With reference to Table 8A, 52% males are willing to pay Rs.50 for home cooked food. 33% males are willing to pay between Rs.51-75 for home cooked food. 9% males are willing to pay between Rs.76- 100 for home cooked food. 49% females are willing to pay Rs.50 for home cooked food; 30% females are willing to pay Rs.51-75 for home cooked food while 11% females are willing to pay Rs.76-100 for home cooked food. Thus, respondents are price sensitive when it comes to ordering the delivery of home cooked food.

Table 8A. Price That Respondents Are Willing To Pay For Home Cooked Food

	Males	Females
Rs 50	84	26
Rs 51 – Rs 75	54	16
Rs 76 – Rs 100	15	6
Greater than Rs 100	10	5
Total	**163**	**53**

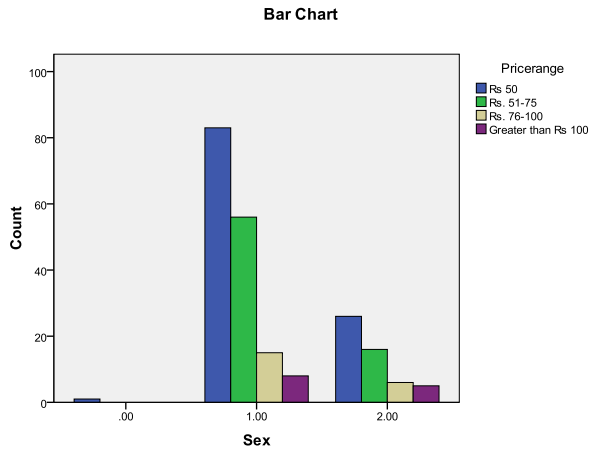

Table 8B shows the cross-tabulation indicating the different price points of home cooked food delivery service based on gender. When we look at Table 8C in the Annexure, we are interested in the results of the "**Pearson Chi-Square**" row. We can see here that χ (1) = 2.751, p = .839. This tells us that there is no statistically significant association between Gender and Preferred price levels that is, both Males and Females equally prefer delivery of home cooked food regardless of the price levels. I.e. at different price levels, the preferences of male and female consumers for delivery of home-made tiffins are the same. Phi and Cramer's V are both tests of the strength of association. From Table 8D (Symmetric measures), we can see that the strength of the association between the variables (price and gender) is very weak.

Table 8B. Sex * Price Range Cross-Tabulation

			Price range				Total
			Rs 50	Rs. 51-75	Rs. 76-100	Greater than Rs 100	
Sex	.00	Count	1	0	0	0	1
		% within Sex	100.0%	.0%	.0%	.0%	100.0%
		% within Price range	.9%	.0%	.0%	.0%	.5%
		% of Total	.5%	.0%	.0%	.0%	.5%
	1.00	Count	83	56	15	8	162
		% within Sex	51.2%	34.6%	9.3%	4.9%	100.0%
		% within Price range	75.5%	77.8%	71.4%	61.5%	75.0%
		% of Total	38.4%	25.9%	6.9%	3.7%	75.0%
	2.00	Count	26	16	6	5	53
		% within Sex	49.1%	30.2%	11.3%	9.4%	100.0%
		% within Price range	23.6%	22.2%	28.6%	38.5%	24.5%
		% of Total	12.0%	7.4%	2.8%	2.3%	24.5%
Total		Count	110	72	21	13	216
		% within Sex	50.9%	33.3%	9.7%	6.0%	100.0%
		% within Price range	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	50.9%	33.3%	9.7%	6.0%	100.0%

Table 8C. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.751[a]	6	.839
Likelihood Ratio	3.003	6	.809
Linear-by-Linear Association	1.197	1	.274
N of Valid Cases	216		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .06.

Table 8D. Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.113	.839
	Cramer's V	.080	.839
N of Valid Cases		216	

The research question – how can the service delivery model of Mumbai dabbawalas be replicated in a growing city like Bangalore - was addressed as part of the survey. Look at Table 9 in Annexure. It shows that 76% males feel that the dabbawala food delivery service can be popular in Bangalore. 87% females feel that the dabbawala service can find acceptance in Bangalore.

Table 9. The Chance That the Dabbawala Service Can Be Successful in Bangalore

	Males	Females
Yes	124	46
No	39	7
Total	**163**	**53**

Interestingly, as per Table 10, only 20% respondents feel that the service can be replicated in Bangalore in exactly similar format. Respondents were asked to select reason why the Mumbai dabbawala model would be difficult to replicate in Bangalore. The answers were interesting. Looking at Table 11, 63% respondents felt that absence of a suburban rail network in Bangalore was a major impediment. 18% respondents highlight the cultural differences between the two cities as a cause. Mumbai is a bustling, fast city while Bangalore is relatively laid back. The prevalence of migrant population with dual family incomes is much higher in Bangalore. 14% respondents felt that food aggregators have been efficient in food delivery and so this would obviate the need for a home cooked delivery service.

Table 10. Replication of Service Delivery Model of Mumbai Dabbawalas in Bangalore

Model can be exactly replicated in Bangalore	20%
Model cannot be exactly replicated in Bangalore	80%

Table 11. Reasons for Difficulty in Replicating the Model in Bangalore

Reasons	% of respondents
Absence of mass rapid transportation system in Bangalore	63%
Cultural differences between Mumbai & Bangalore	18%
Emergence of food start-ups in Bangalore	14%
Demographical differences between the two cities	5%

12. Calculation of Summarized Rank Order

A question was asked to respondents asking them to rank various parameters on a scale of 1 to 5 where 1= Highest Rank and 5= Lowest Rank. 95 males and 30 females had responded to this question by ticking all the options. Incomplete responses were ignored.

Table 12A. Distribution of Ranks Assigned To Tasty and Nutritious Food

Rank	Frequency	Percentage
1	60	48%
2	14	11.2%
3	21	16.8%
4	21	16.8%
5	9	7.2%

Table 12B. Distribution of Ranks Assigned To Delivery

Rank	Frequency	Percentage
1	25	20%
2	33	26.4%
3	30	24%
4	27	21.6%
5	10	8%

Table 12C. Distribution of Ranks Assigned To Hot Food

Rank	Frequency	Percentage
1	15	12%
2	38	30.4%
3	26	20.8%
4	25	20%
5	21	16.8%

Table 12D. Distribution of Ranks Assigned To Price

Rank	Frequency	Percentage
1	17	13.6%
2	30	24%
3	35	28%
4	22	17.6%
5	21	

Table 12E. Distribution of Ranks Assigned To Variety of Food

Rank	Frequency	Percentage
1	8	6.4%
2	11	8.8%
3	16	12.8%
4	29	23.2%
5	61	48.8%

Attribute	Rank					Rank Order
	1	2	3	4	5	
Delivery	25	33	30	27	10	339
Price	17	30	35	22	21	375
Hot food	15	38	26	25	21	373.99
Tasty & Nutritious food	60	14	21	21	9	280.05
Variety in menu	8	11	16	29	61	499.05

Attribute with the first rank was given the lowest number (1) and the least preferred attribute was given the highest number (5). Therefore from the above Table, we can infer that the lowest value is the most preferred.

The total lowest score indicates the first preference ranking. The results show the following rank ordering:

- Tasty and Nutritious Food
- Delivery
- Hot food
- Price
- Variety in Menu

Thus taste, nutrition and delivery are vital attributes that respondents consider while opting for homemade tiffins. Based on the ranks given by respondents, a weighted score was calculated based on sex. Males give preference to price while females give preference to hot food. The results are tabulated below:

	Males (Rank)	Females (Rank)
Delivery on time	2.67 (2)	2.83 (2)
Price	2.78 (3)	3.7 (5)
Hot food	2.96 (4)	3.1 (3)
Tasty & nutritious food	2.41 (1)	1.7 (1)
Variety in menu	4.1 (5)	3.67 (4)

Correlations – Reference to tables 13A to 13F. There is a correlation between gender and preference for tasty food. There is no correlation between gender and delivery. There is correlation between gender and price sensitivity. There is correlation between gender and variety in the menu. There is no correlation between gender and the temperature at which food is served.

Table 13A. Correlation between Gender And Taste of Food

			Sex	Tasty food
Spearman's rho	Sex	Correlation Coefficient	1.000	-.236**
		Sig. (2-tailed)	.	.008
		N	125	125
	Tasty food	Correlation Coefficient	-.236**	1.000
		Sig. (2-tailed)	.008	.
		N	125	125

**. Correlation is significant at the 0.01 level (2-tailed).

Table 13B. Correlation between Gender and Delivery of Food

			Sex	Delivery
Spearman's rho	Sex	Correlation Coefficient	1.000	.074
		Sig. (2-tailed)	.	.415
		N	125	125
	Delivery	Correlation Coefficient	.074	1.000
		Sig. (2-tailed)	.415	.
		N	125	125

Table 13C. Correlation between Gender and Price

			Sex	Price
Spearman's rho	Sex	Correlation Coefficient	1.000	.302**
		Sig. (2-tailed)	.	.001
		N	125	125
	Price	Correlation Coefficient	.302**	1.000
		Sig. (2-tailed)	.001	.
		N	125	125

**. Correlation is significant at the 0.01 level (2-tailed).

Table 13D. Correlation between Gender and Variety in Menu

			Sex	Variety menu
Spearman's rho	Sex	Correlation Coefficient	1.000	-.180*
		Sig. (2-tailed)	.	.045
		N	125	125
	Variety menu	Correlation Coefficient	-.180*	1.000
		Sig. (2-tailed)	.045	.
		N	125	125

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13E. Correlation between Gender and Hot Food

Correlations

			Sex	Hot food
Spearman's rho	Sex	Correlation Coefficient	1.000	.037
		Sig. (2-tailed)	.	.680
		N	125	125
	Hot food	Correlation Coefficient	.037	1.000
		Sig. (2-tailed)	.680	.
		N	125	125

For the Likert scale question, reliability analysis was done using Cronbach alpha. The output is presented below. Initially, Cronbach alpha was 0.702. After deleting one of the items, the reliability of the scale improved to 0.745.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.702	.733	6

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.745	.744	5

Table 13F. Correlations

			Sex	Hotfood	Delivery	Price	Variety menu	Tasty food
Spearman's rho	Sex	Correlation Coefficient	1.000	.037	.074	.302**	-.180*	-.236**
		Sig. (2-tailed)	.	.680	.415	.001	.045	.008
		N	125	125	125	125	125	125
	Hotfood	Correlation Coefficient	.037	1.000	-.130	-.384**	-.362**	-.168
		Sig. (2-tailed)	.680	.	.148	.000	.000	.061
		N	125	125	125	125	125	125
	Delivery	Correlation Coefficient	.074	-.130	1.000	.000	-.214*	-.563**
		Sig. (2-tailed)	.415	.148	.	.998	.017	.000
		N	125	125	125	125	125	125
	Price	Correlation Coefficient	.302**	-.384**	.000	1.000	-.205*	-.336**
		Sig. (2-tailed)	.001	.000	.998	.	.022	.000
		N	125	125	125	125	125	125
	Varietymenu	Correlation Coefficient	-.180*	-.362**	-.214*	-.205*	1.000	-.011
		Sig. (2-tailed)	.045	.000	.017	.022	.	.907
		N	125	125	125	125	125	125
	Tastyfood	Correlation Coefficient	-.236**	-.168	-.563**	-.336**	-.011	1.000
		Sig. (2-tailed)	.008	.061	.000	.000	.907	.
		N	125	125	125	125	125	125

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

13. Data Analysis

Respondents prefer tasty and nutritious food that can be delivered on time. So, these two factors are critical success factors for setting up a Bangalore dabbawala system.Based on focused review of literature and based on empirical study, it is clear that a home-food delivery service can be launched in Bangalore on similar lines as Mumbai dabbawala model – however it is not possible to replicate the model exactly as it is. 80% respondents opine that Mumbai food delivery model cannot be exactly replicated in Bangalore. Several elements characteristic of Mumbai are absent in other Indian urban contexts – extensive transportation network, a large working class using the mass transportation and cultural unity of the dabbawalas[19]. This makes it difficult to replicate the service in other cities in exactly the same form. Among the respondents surveyed, both male and female respondents are equally aware about the Mumbai dabbawala services. Majority of respondents show preference for consuming homemade food. Taste of home cooked food was the main reason why respondents preferred tiffin services. Price and taste are drivers for respondents to opt for a dabbawala service in Bangalore. Respondents are price-sensitive when it comes to ordering home cooked food. Interestingly 76% males and 87% females felt that the dabbawala service can be introduced in Bangalore, only 20% of the respondents feel that the Mumbai dabbawala service can be exactly replicated in Bangalore. Taste, nutrition and delivery are key attributes that respondents consider while opting for homemade tiffins.Correlation analysis shows that there is no correlation between gender and the temperature at which the food is delivered. Both female and male respondents equally prefer food that is delivered hot; the summarized rank order also shows that delivery of hot food gets the third priority among the respondents.

14. Discussion

Mumbai boasts of a well-connected suburban railway network while Bangalore has been struggling to create one due to lack of political will. The Metro rail network in Bangalore connects the city in parts and serves no major role in reducing transportation bottlenecks. Use of own vehicles to reach office is another trend in Bangalore in which case people prefer to carry their home made food along with them. Organisations in Bangalore do provide good canteen facilities for their employees Provision of food-heating arrangements in offices is added benefit. Food aggregators also deliver food services at home/ office.It would be difficult to scale up the service in the absence of sufficient demand and without scaling up; it is not possible to achieve operational efficiency. Work place routes in Mumbai from North to South are predictable and this is one of the reasons why the Mumbai dabbawala service has endured. However, in cities like Bangalore, work place routes are often unstructured and do not fall in a linear space. At best, the Mumbai dabbawala model can be tweaked and customized to adapt to the needs of the local populace in a growing city like Bangalore. No canteen or 5-star service can manage to match the taste of home-cooked food. This is the reason Bangalore needs a dabbawala type service that can deliver hot home-cooked meals. With the onset of lifestyle diseases plaguing people working in the Silicon-valley of India, the need for a service similar to Mumbai dabbawala has always been acutely felt. Diabetologists and doctors also say the way the city has changed does not really help diabetes patients. "Long hours of work, waiting in traffic, fewer places to walk and the availability of junk food everywhere are reasons why diabetes and other lifestyle-related diseases are on the increase," says Preetham Kaur, a doctor in Bangalore who has been treating women with diabetes for over 20 years now. Doctors like K. Suresh, Director Jain Institute of Vascular Sciences, are of the opinion that about 10 to 15 per cent of the adult population in Bangalore is affected with diabetes and the numbers are certainly on the increase as more people slip in to sedentary lifestyles.

While dabbawalas were meant to deliver and pick-up lunch boxes, cooking has been included in this portfolio. Sai Krupa Ghar Ka Khana was initiated by Sonia Mahanti in Bangalore in 2003. Though the operations have sustained, scaling up is an issue. In Mumbai, people pay from their pockets while in Bangalore often the companies sponsor the meal.

Even the Mumbai dabbawalas are skeptical about scaling up their service in cities other than Mumbai. The problem is in getting the numbers. Secondly, low cost transportation that is the hallmark of Mumbai is conspicuous by its absence in Bangalore. The Mumbai dabbawalas are also scared of diluting their standards if they spread themselves too thin.

Food delivery service is often challenging. Unless it is

food cooked in one's own homes, customer expectations from a professional home-made food tiffin service can be varied. Hygiene, taste and price are crucial variables that influence customer satisfaction.

Customizing food for more than five customers can bring down the operational efficiency. Fickle customers can also use the tiffin service for merely six months and switch over to other options. Food delivery is a service where monotony can set in over a period of time.

Emergence of food Tech startups in Bangalore is another major reason why dabbawala service may find fewer takers here- a lot of home delivery food startups like fresh menu, food panda, zomato and swiggy deliver food on call with best possible options to eat. No doubt these startups have invested their own funds till the last mail delivery system. Penetrating such a market without investment support can be difficult. Food apps deliver food prepared in the restaurants but they do not have the appeal of a home cooked meal. Thus by adequate differentiation of the tiffin service, the service can be made more appealing.

The Mumbai dabbawala delivery model can be revamped so that food delivery can be covered for short distances in Bangalore. This means that the model is not scalable (in terms of long distance food delivery) but it can still be a reasonably modest attempt in ensuring that at least some sections of the population can enjoy the benefits of consuming home cooked food. Vehicular transportation of food via road will adversely impact operational efficiency.

A dabbawala operation in Bangalore can work if the areas are demarcated constituency wise and where the pickup and delivery points are at a reasonable distance from each other. For instance, it is possible to carry home cooked food for short distances. For instance, areas like Domlur, Indira nagar, Jeevan Bhima Nagar, HAL, C V Raman Nagar can be serviced by a network of cycle bound dabbawalas who can be from the same community so as to foster greater team spirit and mutual cohesion in delivering the service immaculately. Those who live in these areas and work in these areas can benefit from having fresh home cooked food. The operation will be ecofriendly and multiple trips can be made on cycles. If this model is successful, it will be easy to replicate the same in other pockets of Bangalore. The target groups need not be only office goers but also small traders, shop keepers, school children and school teachers.

Since the public transportation system in Bangalore is unlike that in Mumbai, an economical private system of transportation can be thought off. One suggestion can be introduction of a low cost LPG operated three wheeled carriers. A number of such vehicles can be introduced with proper networking. These vehicles can deliver the dabbas from various parts of the city and suburban areas into city central. At a central location change of dabbas into various vehicles related to particular deliveries can be made. An accurate system of coding is essential to ensure proper networking and proper exchange of vehicles. The vehicles which essentially has to be economically operated can be procured based on co-operative system with any kind of government aid for economically weaker sections or any startups can support this venture. Public sector banks can also offer suitable advances to take up this venture. This may substitute for the transport system available for the dabbawalas as in Mumbai.

Whatever be the modifications in the model, it has to be clearly understood that affordability of delivery service and the emotional attachment to food cooked at home are two critical success factors that can ensure the success of the Bangalore Dabbawala food delivery system. The food prepared in one's home is cooked with love and affection taking proper care about hygiene and other aspects. So there is no comparison between food cooked outside and food cooked in one's home. Selection of food delivery boys must be done carefully as these boys are responsible for last mile delivery. It is important to exclude those individuals from the selection process who are qualified and are susceptible to frequently switch jobs. It would make sense to select school drop-outs who will be eager to do a job that will give them immense job satisfaction.

15. Conclusion

This research looked at the feasibility of introducing the famed food delivery service of Mumbai in Bangalore. A review of literature highlighted the unique features of Mumbai dabbawalas – some of the features are such that it may be impossible to replicate the delivery system in other Indian cities. Empirical study has highlighted the need for a home-food delivery system in a growing city like Bangalore but it has also highlighted infrastructural, cultural and demographic differences between Mumbai and Bangalore that can impede the replication of a similar model.

The Mumbai Dabbawala operation model defies all conventional logic and is therefore counter intuitive. These simple food delivery men have achieved so many feats without a basic formal education. They have been purely guided by their instincts and inherent skill and competency. Their service delivery excellence has put them in the global spotlight. Their delivery model boasts of operational flexibility. The delivery operation meets the exacting standards of Six Sigma. Community bonding and team cohesion result in very few interpersonal skirmishes among the dabbawalas. The Mumbai dabbawalas truly exemplify the saying – Work is Worship.

It will take Bangalore's Dabbawallas some time to match up to their Mumbai counterparts, transforming themselves into a full- fledged business model with increase in both demand and supply. Good food not only makes one healthy but also changes the mood and improves performances and productivity in daily life. In this hustle bustle of life, people tend to compromise mainly on the kind, quality and the amount of food they eat which in turn causes a number of health issues like obesity, diabetes, hypertension, cancer etc. Specially people in jobs demanding long hours tend to skip meals or eat any kind of fat loaded junk food that they can find around them.

Choice of deciding personalized menu and food packed in disposable containers or hygienic dabbas are the best to carry on. Having a variety of menu options to choose from or giving the flexibility to the customer to choose the menu a week in advance is an ideal strategy. The Bangalore 's Dabbawala services has to stand distinct, carving a niche for themselves apart from the plethora of app- based food delivery services. Thus, differentiation is the key for a sustainable business model of the Bangalore dabbawalas.

Start-up culture abounds in Bangalore. It is definitely possible for a start-up to evolve a unique, distinct food delivery model in Bangalore – a model that stands out from the scores of food delivery services. The paper has proposed one such model where food can be delivered over short distances. Mumbai dabbawala delivery model can serve as inspiration. A cost-effective food delivery service can be introduced not just for office goers but also for students in various educational institutions in Bangalore. Such a delivery service can popularize healthy food weaning students away from perilous junk foods.

Thus, a modified food delivery model can be implemented for a growing city like Bangalore.

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