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Vegetable wastage and economic dimensions in retail marketing: Ratnagiri district

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Abstract

A study on retail vegetable marketing was conducted in Ratnagiri district (Maharashtra). 100 vegetable sellers consisting of 45 roadside vendors and 55 retailers were selected. In study area, 38 vegetables were found to be sold in retail markets. Indicating a variety of vegetables made available in consumers' baskets. The annual average quantity of vegetables purchased was 38467 kg, quantity sold in the retail market was 34109 kg resulting in a wastage of about 4339 kg (11.29%) Among the different vegetables potato, radish, ridge gourd, and elephant yam fall into high wastage categories. lemon, mushroom, and Colocasia leaves were found to be less wastage categories. The overall hike in the selling price over buying rate was 62.16 percent. Out of the total cost in retail marketing, 98.98 percent was variable cost, 1.01 percent was fixed cost. Among the variable cost items were the cost of vegetables (85.11%) and fuel and transport (8.09%). The total cost, gross income, and net return were Rs 1287377, Rs1613208, and Rs3258301, respectively, resulting in a B: C ratio of 1.25 indicating the profitability of the venture. Wastage percentage of vegetables is 11.29 percent due to which income reduction is 17.10 percent. Fluctuations in market prices, lack of storage, and loss of vegetables in transportation were found to be major constraints in retail vegetables. It was concluded that the strategic planning required to curb the wastage in vegetable marketing by providing storage, and transportation facilities so that it will benefit vegetable sellers as well as producers.

Keywords: Vegetable wastage, economic dimensions, retail marketing

1. Introduction

A study on vegetable marketing in the Konkan region aimed to elucidate the intricate dynamics of the unorganized sector. The initial phase involved identifying the array of vegetables available in selected markets, encompassing both retailers and roadside vendor stalls along highways. Subsequent research delved into the financial intricacies, encompassing the estimation of costs, income generation, and stock management by retailers. This shed light on the economic dimensions of vegetable retailing. Seasonal variations in vegetable availability and the associated challenges of wastage in the retail marketing process were also meticulously assessed, providing valuable insights into the hurdles faced by retailers in efficiently managing inventory. Furthermore, the study documented the constraints experienced by retailers in the Konkan region, contributing essential information aimed at improving the efficiency and organization of vegetable marketing in this evolving agricultural landscape.

2. Materials and Methods

Ratnagiri District in the Konkan region of Maharashtra for the present study stemmed from the absence of prior research in the area and the prevalent dependence on vegetables sourced from other districts, resulting in minimal locally grown produce reaching consumers within the district. Recognizing this gap, a comprehensive investigation into retail vegetable marketing in Ratnagiri District was deemed imperative, encompassing crucial aspects such as vegetable prices, vendor income, arrival patterns, and wastages. Employing a randomized selection process, five tahsils were chosen, and from each tahsil, two villages or cities were selected randomly. Subsequently, ten sample respondents, comprising both retailers and vendors, were randomly identified from each village or market, resulting in a total sample size of 55 retailers and 45 vendors engaged in vegetable marketing within the selected markets. The data collection process involved the utilization of specially designed schedules to gather primary data from the sample respondents.

3. Results and Discussion

3.1 Vegetables identified in study area

Local markets in the study area featured a diverse array of 38 commonly found vegetables, each characterized by its unique botanical and local nomenclature. This vegetable assortment encompassed a variety of types, including leafy greens, fruity vegetables, and members of the Cruciferae family. Among the leafy vegetables were staples like spinach (*Spinacia oleracea*), fenugreek leaves (*Trigonella foenum*), and

coriander leaves (*Coriandrum sativum*). Fruity vegetables, such as tomatoes (*Lycopersicon esculentum*) and brinjal (*Solanum melongena*), were also prevalent. Additionally, certain vegetables belonged to the Cruciferae family, exemplified by cabbage (*Brassica oleracea capitata* var) and cauliflower (*Brassica oleracea*). This comprehensive catalog of vegetables not only reflects the rich diversity in local markets but also underscores the varied culinary and nutritional offerings available to consumers.

Table 1: Information about list of vegetables sold in study area by sample respondents

Sr. No.	Vegetables name	Botanical name	Local name
1	Onion Small	<i>Allium cepa</i>	Kanda
2	Tomato	<i>Lycopersicon esculentum</i>	Tamatar
3	Chilli	<i>Capcium annum L</i>	Mirchi
4	Potato	<i>Solanum tuberosum</i>	Batata
5	Amaranthus leaves	<i>Amaranthus gangeticus L</i>	Math
6	Capsicum (<i>Shimla</i>)	<i>Capcium Annum L</i>	Shimla Mirchi
7	Bitter gourd	<i>Momordica charantia</i>	Karle
8	Bottle gourd	<i>Lagenaria siceraria</i>	Dudhi bhopala
9	Cabbage	<i>Brassica oleracea capitata var</i>	Kobbi
10	Cauliflower	<i>Brassica oleracea</i>	Flower
11	Cluster bean	<i>Cyamopsis tetragonoloba</i>	Gawar
12	Coriander leaves	<i>Coriandrum sativum</i>	Kothimbir
13	Drumstick	<i>Moringa oleifera</i>	Sheng
14	Brinjal	<i>Solanum melongena</i>	Wangi
15	Fenugreek Leaves	<i>Trigonella foenum</i>	Methi
16	French Beans	<i>Phaseolus vulgaris</i>	Faras bee
17	Garlic	<i>Allium sativum</i>	Lassun
18	Ridge Gourd	<i>Luffa acutangula</i>	Dodka
19	Snake Gourd	<i>Trichosanthes cucumerina var</i>	Padwal
20	Spinach	<i>Spinacia oleracea</i>	Palak
21	Elephant Yam	<i>Amorphophallus paeoniifolius</i>	Suran
22	Pumpkin	<i>Cucurbita moschata</i>	Bhopala
23	Carrot	<i>Daucus carota</i>	Gajar
24	Ladies finger	<i>Abelmoschus esculentus</i>	Bhendi
25	Sweet potato	<i>Ipomoea batatas</i>	Ratali
26	Radish	<i>Raphanus sativus</i>	Mula
27	Lemon-	<i>Citrus limon</i>	Limbu
28	Ivy gourd--	<i>Coccinia grandis</i>	Tondali
29	Green onion	<i>Allium fistulosum</i>	Kande pat
30	Ginger-	<i>Zingiber officinale</i>	Aale
31	Dill leaves	<i>Anethum graveolens</i>	Shepoo
32	Colocasia leaves	<i>Colocasia esculenta</i>	Aloo
33	Broad bean-	<i>Vicia faba</i>	Pavtha
34	Beet root	<i>Beta Vulgaris</i>	Beet
35	Ash gourd	<i>Benincasa hispida</i>	Kohla
36	Butter beans-	<i>Phaseolus lunatus</i>	Ghevada
37	Mushroom	<i>Agaricus bisporus</i>	Mushroom
38	Mint leaves	<i>Mentha spicata</i>	Pudina

3.2. Stock Handle

Information regarding stock handle by retailers and vendor despite in table 2.

The stock handled by respondents revealed that the annual quantity of vegetables purchased by the sample respondents amounted to 38,449 kg. Notably, an overarching trend indicated that retailers procured a higher quantity of vegetables, totaling 43,908 kg, compared to vendors who handled 31,775 kg. Analyzing the specific vegetable types

sold in the study area, it was evident that Brinjal constituted the highest quantity at 2,989 kg, accounting for 7.77 percent of the total, followed by tomato at 2,616 kg (6.80%), onion at 2,521 Kg (6.55%), chili at 2,506 Kg (6.51%), and coriander leaves at 2,465 kg (6.40%). Among leafy vegetables, fenugreek leaves led with 610.98 kg, followed by Amaranthus at 490 kg, spinach at 686 kg, and onion green at 1,084 kg. In summary, the study concluded that these ten vegetables were the predominant varieties sold in the study area.

Table 2: Vegetable purchased by sample respondents in selected markets (unit in kg)

Sr. No.	Name of vegetable	Group		
		Roadside vendor (N= 45)	Retailer (N=55)	Overall (N=100)
		Purchase Quantity Kg	Purchase Quantity Kg	Purchase Quantity Kg
1	Ladies finger	1597	1687	1647
2	Onion small	1877	3047	2521
3	Tomato	2059	3072	2616
4	Chilli	1823	3065	2506
5	Potato	1870	2897	2435
6	Amaranthus	420	546	490
7	Capsicum((Shimla)	1117	1551	1356
8	Bitter Gourd	967	1449	1232
9	Bottle Gourd	956	1434	1219
10	Cabbage	1024	1313	1183
11	Cauliflower	1083	1353	1232
12	Cluster Bean	1072	1408	1257
13	Coriander leaves	1900	2928	2465
14	Drumsticks	580	1009	817
15	Brinjal	2767	3171	2989
16	Fenugreek leaves	495	706	611
17	French Bean	1057	1276	1178
18	ridge Gourd	965	1231	1111
19	Snake gourd	970	1111	1048
20	Spinach	554	794	686
21	Cucumber	546	747	656
22	Elephant Yam	330	503	425
23	Pumpkin	327	411	373
24	Carrot	550	697	631
25	Sweet Potato	151	213	185
26	Radish	342	535	448
27	Mushroom	27	40	34
28	Mint Leaves	338	542	450
29	Lemon	144	253	204
30	ivy Gourd	319	504	421
31	Onion Green	988	1163	1084
32	Ginger	324	450	394
33	Dill Leaves	387	477	436
34	Colocasia leaves	23	24	24
35	Broad Bean	143	280	218
36	Beetroot	324	534	440
37	Ash Gourd	138	191	167
38	Butter Beans	1150	1377	1275
	Total	31706	43990	38467

3.3 Sale of vegetables

Information regarding quantity of vegetables sold in retail marketing despite in table 3.

It was observed from the table that at the overall level annual average quantity of all vegetables sold by the sample respondents was 34109 kg. The quantity sold in the case of the retailer was 42.60% higher (39407 kg) than the vendor. (27634 kg). At the overall level, the maximum quantity (8.03%) of 2737 kg was sold in the case of Brinjal, followed by tomato (6.91%) small onion (6.80%), potato (6.63%), etc.

Out of total of 38 vegetables sold in the study area in retail markets the brinjal, tomato, small onion, green chili, capsicum (Shimla), bitter guard, butter beans, coriander leaves, potato, French bean, bottle gourd, were major vegetables sold in the retail market. A similar trend was observed in both the groups of roadside vendors and retailers. It was also concluded that most of the vegetables are brought from the markets in other districts of Maharashtra which underlines the need for area expansion in Ratnagiri district for vegetables to meet the demand of local people in the district.

Table 3: Information regarding the quantity of vegetables sold in retail marketing

Sr. No.	Name of vegetable	Group		
		Roadside vendor (N=45)	Retailers (N=55)	Overall (N=100)
		Sold Quantity in Kg	Sold Quantity in Kg	Sold Quantity in Kg
1	Ladies finger	1553	1467	1506
2	Onion small	1692	2872	2341
3	Tomato	1712	2887	2358
4	Green chilli	1622	2816	2279
5	Potato	1666	2746	2260
6	Amaranthus	327	435	387
7	Capsicum (Shimla)	1008	1389	1217
8	Bitter Gourd	849	1299	1097
9	Bottle Gourd	822	1298	1084
10	Cabbage	893	1159	1039
11	Cauliflower	937	1226	1096
12	Cluster Bean	928	1263	1112
13	Coriander leaves	1708	2666	2235
14	Drumsticks	507	865	704
15	Brinjal	2514	2920	2737
16	Fenugreek leaves	438	606	531
17	French Bean	900	1130	1027
18	ridge Gourd	772	1053	926
19	Snake gourd	775	998	897
20	Spinach	490	706	609
21	Cucumber	441	644	553
22	Elephant Yam	286	447	374
23	Pumpkin	280	357	322
24	Carrot	473	591	538
25	Sweet Potato	127	174	153
26	Radish	285	409	353
27	Mushroom	25	35	30
28	Mint Leaves	310	457	391
29	Lemon	109	203	161
30	ivy Gourd	274	412	350
31	Onion Green	829	1045	948
32	Ginger	264	369	321
33	Dill Leaves	331	422	381
34	colocasia leaves	1	21	12
35	Broad Bean	116	222	175
36	Beetroot	252	404	335
37	Ash Gourd	119	148	135
38	Butter Beans	999	1249	1136
	Total	27634	39408	34109

3.4. Wastage of vegetables in retail marketing

The information regarding vegetable-wise wastage that occurred during handling, loading, unloading, and storage at the retail marketing level is presented below in Table 4.

It was revealed from the table that at the overall level, total annual vegetable seller wastage was 4339 kg however in the case of Roadside vendor and retailer the figures of total annual wastage were 4141 kg and 4501 kg, respectively the overall level average wastage of vegetables was 11.19 percent it was also observed that the wastage in the case of Roadside vendors was much higher (13.03%) than retailers (10.27%) it was concluded that the wastage at overall level (11.29%) is also quite large and it should be minimized the various corrective measures should be taken to curb this wastage to

minimize. The proper transport, storage facilities, handling, etc have a good scope to play their role in reducing the wastage of vegetables, so that land, labour, and input invested in production can be justified, and producers and consumers both will be benefitted.

The scenario of vegetable-wise wastage indicated that the highest amount of wastage was found to be estimated in the case of tomato, followed by brinjal, and coriander, ridge gourd. It was also observed that the minimum wastage percentage was observed in the case of Colocasia leaves, followed by mushrooms, lemon, etc. It was concluded that vegetable wastage should be reduced by appropriate measures and strengthening of infrastructure facilities for storage, transportation, handling, etc.

Table 4: Information regarding the quantity of vegetable wastage in retail marketing

Sr. No.	Name of vegetable	Group		
		Roadside vendor N=45	Retailers (N=55)	Overall (N=100)
		Wastages Quantity in Kg	Wastages Quantity in Kg	Wastages Quantity in Kg
1	Ladies finger	135	130	132
2	Onion small	185	176	180
3	Tomato	347	185	258
4	Green chilli	200	249	227
5	Potato	204	151	175
6	Amaranthus	93	111	103
7	Capsicum	109	163	139
8	Bitter Gourd	118	150	135
9	Bottle Gourd	133	137	135
10	Cabbage	131	154	144
11	Cauliflower	146	127	136
12	Cluster Bean	144	146	145
13	Coriander leaves	192	263	231
14	Drumsticks	73	145	113
15	Brinjal	252	252	252
16	Fenugreek leaves	57	100	80
17	French Bean	157	146	151
18	ridge Gourd	193	179	185
19	Snake gourd	195	114	151
20	Spinach	64	89	78
21	Cucumber	105	103	104
22	Elephant Yam	45	56	51
23	Pumpkin	47	54	51
24	Carrot	77	107	93
25	Sweet Potato	25	40	33
26	Radish	57	125	95
27	Mushroom	2	5	4
28	Mint Leaves	29	85	60
29	Lemon	35	50	43
30	ivy Gourd	45	92	71
31	Onion Green	159	118	137
32	Ginger	60	82	72
33	Dill Leaves	56	54	55
34	colocasia leaves	1	3	2
35	Broad Bean	27	57	44
36	Beetroot	72	131	104
37	Ash Gourd	19	43	32
38	Butter Beans	151	128	138
	Total	4141	4501	4339

3.5. Cost and returns

The information about cost incurred and returns received in retail marketing of vegetable is depicted in table 5.

The analysis compared 45 roadside vendors and 55 retailers, revealing that vegetable costs significantly influenced variable expenses, comprising 89.42% for roadside vendors and 82.89% for retailers. Fuel and transport costs played a notable role, accounting for 8.22% and 8.02%, respectively. Working capital expenses were substantial for both groups, constituting 99.32% for roadside vendors and 92.73% for retailers, with interest on working capital at 0.63% and 5.75%, respectively. Fixed costs, including interest on fixed capital and

depreciation, were lower. Roadside vendors and retailers had benefit-cost ratios of 1.28 and 1.24, respectively. Net income differed, with roadside vendors at 268,993 and retailers at 372,334, highlighting distinct profitability levels. Variable costs were driven mainly by vegetable costs at 85.11%, with minor contributions from taxes, electricity, and fuel/transport. Working capital expenses constituted 94.97%, while fixed costs were 1.01%. The overall total cost was 98.98%, and gross income covered 100%, resulting in a net income of 3,258,301 and a benefit-cost ratio of 1.25, indicating a favorable financial outcome for the entire respondent group.

Table 5: Cost incurred and returns received by road vendor and retailer in the marketing of vegetables in the study area (Values in Rs)

Sr. No.	Particulars	Groups		
		Roadside vendor (N=45)	Retailer (N=55)	Overall (N=100)
A	Variable Cost			
1	Cost vegetable	869331	1280975	1095735
2	Tax, Nagar Parishad, Nagar Panchayat	7200	8800	8080
3	Electricity battery etc	1569	9600	5986
4	Fuel, Transport	80000	124000	104200
5	Hamals	7500	9600	8655
6	Working Capital	965600	1432975	1222656
7	Interest on Working Capital	6152	88955	51694
	Total Variable Cost	971752	1521930	1274350
B	Fixed Cost			
1	Interest on Fixed Capital	190	15250	8473
2	Depreciation	210	8109	4554
3	Total Fixed cost	400	23359	13027
C	Total Cost	972152	1545289	1287377
D	Gross Income	1241145	1917623	1613208
E	Net Income	268993	372334	3258301
F	Benefit Cost Ratio	1.28	1.24	1.25

3.6 Reduction of income due to fruit wastage

An attempt has been made to work out the wastage of vegetables in retail marketing.

The information regarding reduction of income due to vegetables wastage is presented in table 6.

Table 6: Annual reduction of income of retailers/vendors due to vegetable wastage

Sr. No.	Particulars	Unit	Roadside vendor (N=45)	Retailer (N=55)	Overall (N=100)
A	Quantity Purchase	Kg	31775	43908	38449
	Value of purchased vegetables	Rs	869330	1280974	1095734
B	Quantity Sold	Kg	27634	39408	34109
	Value of sold vegetables	Rs	1241144	1917623	1613207
C	Wastage Quantity	Kg	4141	4501	4339
	Value of wastage Vegetables	Rs	371813	197242	275799
	Total B + C	Rs.	1612957	2114865	1889007
	Percent Wastages of Vegetables	%	13.03	10.25	11.29
D	Percentage of reduction in income due to Vegetable wastage	%	29.96	10.29	17.1

In the case of roadside vendors, the total quantity of vegetables purchased, sold, and wasted was 31,775 kg, 276.33 kg, and 4,141 kg, respectively. The sale receipt and purchase expenditure were Rs 124,114 and Rs 869,330, with vegetable wastage valued at Rs 371,813, accounting for 13.03% of the total. This implies that approximately 29.46% of the reduction in income, amounting to Rs 371,813, can be attributed to wastage. On the retailer side, 43,908 kg of vegetables were procured, valued at Rs 1,280,974, of which 39,408 kg were sold, generating a gross income of Rs 1,917,623. Unfortunately, 4,501 kg of vegetables were wasted, amounting to Rs 197,242. The total value of vegetables, considering both sales and wastage, was Rs 2,114,865, with a

wastage percentage of 10.25%. Overall, the observed wastage of Rs 275,799 resulted in an actual income of Rs 1,613,207, indicating a substantial 17.10% reduction in income for vegetable sellers due to the 11.29% wastage of 4,339 kg. Efforts should be intensified to minimize wastage, not only boosting income for sellers but also indirectly benefiting producers and conserving invested resources like land and labor

3.7. Constraint faced by retailer in vegetable marketing

The information regarding constraints faced by the roadside vendor and retailers is presented in Table 7.

Table 7: Problems faced by retailers /vendors in marketing of vegetables

Sr. No.	Particulars	Roadside vendor (N=45)	Retailer (N=55)	Overall (N=100)
Problems				
1	Higher cost of transportation	32	42	74
2	Fluctuation in market Prices	45	51	96
3	Distant Market	26	37	63
4	Lack of Storage Facility	38	40	78
5	Loss of vegetables in transit	36	39	75

The study identified significant challenges encountered by both roadside vendors and retailers in vegetable marketing. The foremost constraint, reported by 96% of vegetable sellers, is the fluctuation in market prices, followed by the lack of storage facilities (78%), loss of vegetables in transit (75%),

and the higher cost of transportation (74%). These findings underscore the need for strategic policies and measures to address these issues. The focus should be on reducing the loss of vegetables during transit, cutting transportation costs, and enhancing storage facilities. Implementing such measures is

deemed crucial to enhance the overall efficiency of retail vegetable marketing.

4. Conclusion

1. A total of 38 different types of vegetables were identified and sold in retail marketing in the study area.
2. The annual total cost for sellers was Rs 1,287,377, with the total variable cost amounting to Rs 1,274,350.
3. The gross income annually was Rs 1,613,208 for the overall group, and at the retailer level, it was Rs 1,917,623. The gross income for roadside vendors was Rs 1,241,145, and their benefit-cost ratio was 1:1.25 for the overall group.
4. The total cost constituted 98.98 percent of variable cost and only 1.01 per fixed cost and the major components of the variable cost were the purchase of vegetable 85.11 percent, and fuel and transport charges 8.09 percent.
5. The wastage in the vegetable business was approximately 11.19 percent at the overall level.

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