

A Framework to Develop Reverse Logistics Network for Startup using Hyperlocal Logistics Chain

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Abstract: This research paper helps in devising a framework to establish a reverse logistics network for small businesses or budding startup. A startup needs to explore all the feasible solution before developing reverse logistics by keeping into mind organisational objective of either to save cost or decrease response time. This paper shows how parameters like weight at the source (from where goods have to be picked) and routing of the logistics channel play a crucial role in selecting logistics mode and changing the entire cost structure of the network. Other factors like cost negotiation with vendors and response time are also considered important in developing such network. Here, we shall be using the live case of a startup, which runs on the home-based learning-centre model and tries to use their variables to develop a reverse logistics channel for it. We will be identifying pick-up points from where goods have to be picked and also calculate the weight of the goods kept at these pick-up points. A routing mechanism will be developed for the same. Four methods will be evaluated for reverse logistics of goods from pick-up points and we will see how the cost of logistics, the weight of goods and the number of pick-up points plays an important role in the selection of logistics mode.

Keywords: Reverse Logistics, Operations, Startup, Selection, Logistics Mode, Supply Chain.

I. INTRODUCTION

For a country like India reverse logistics is not as mature as developed countries and this puts a toll on the customer satisfaction level as well as the profitability of the company. Often customers get dissatisfied by the fact the many companies don't have reverse logistics network and the customer has to solely bear the pain of returning the product back to its seller. With the advent of e-commerce in India, much of attention has started to be put in developing reverse logistics network. As the customers are putting lots of purchased goods on return order, it has forced many e-commerce companies to develop a robust reverse supply chain. Small companies or budding startup find it difficult to develop their own reverse logistics network. The reason identified for this is the unavailability of a standard framework which a company can follow and moreover it requires extra efforts to develop everything from basics and hence these startups carries a casual approach towards it. As such companies have to rely on third-party logistics to run their reverse supply chain and compromise on their revenues.

II. LITERATURE REVIEW

The studies in the field of reverse logistics started in the early eighties and most of it focuses on technical and operational issues. These issues were related to design of logistics network, optimization of routes and planning (Barnes, 1982). There were many articles that were published in the field of reverse logistics between 1995 and 2005, Rubio et al. (2008) reviewed most of it and found that 65% of these articles used mathematical model for route optimization and 21% of the remaining cases mainly deals with recovery of end-of-life products and inventory management. Bernon et al. (2011) have published work in the field of retail reverse logistics and proposed that as it carries a close relationship with other function of an organisation, retail reverse

logistics should be treated as an integral part of supply chain management. A Spanish researcher (Ramirez, 2012) surveyed various Spanish firm and find out that reverse logistics plays a great role in improving organisation performance. Another researcher from China (Ye et al., 2013) surveyed various manufacturing firms in China and found that product return causes lots of economic stress on the organisation performance. The major factors that influence the development of reverse logistics framework for any organisation are

- Competencies of the firm to develop robust network to reduce cost
- Transactional mechanism designed by the firm
- Government support for firms while undertaking such initiatives

The simple definition of reverse logistics is bringing back goods from customer to the point of sales. Other definitions of reverse logistics focus on the economic aspects of recovery chain (Ravi et al., 2005). Mutha and Pokharel (2009) pointed that reverse logistics is nothing but re-designing the forward supply chain in which products move back from customer to the manufacturer for reproduction, replacement or refurbishment.

III. RESEARCH OBJECTIVE

The research objective is to develop a framework for reverse logistics of sold goods back from customer's place to seller's place at optimal cost and time. It will provide small organisations or startup with various way to develop their reverse logistic chain and select a reverse logistics network depending upon the business requirement of either to have quick response time or to be cost-effective.

IV. SCOPE

- The scope of this research paper includes exploring different methodologies for reverse logistics of sold goods back from customers place to seller's places
- Cost-Benefit analysis of the possible reverse logistics options
- The model is suited for startup as an organisation or small businesses

V. DATA COLLECTION

For the purpose of our research, we considered a startup as a case study for developing its reverse logistics model. This startup runs an after-school math learning programme for kids. It is a home-based math learning centres for kids with multiple teaching centres in any particular city they operate. They provide workbooks to kids for their mental exercise. These workbooks are kept at teaching centre and students are supposed to solve it at teaching centre. Students are refrained from taking these workbooks to home under piracy concerns. Once a student completes a module that particular workbook becomes eligible to be disposed off, so it needs to be brought back to the office to avoid copyright issues. Later on, these can be shredded to avoid further complexities of getting pirated by the spread of duplicate copies.

The academic session of school gets over by March for any particular year so does for the classes run by this startup. It becomes the responsibility of the company to retrieve all these workbooks back from all its teaching centres located in any particular city back to the office for safe disposal. These teaching centres become the pick-up points from where these workbooks have to be brought back.

The number of students associated with each centre becomes the critical factor as it directly affects the weight of workbooks at each pick-up point. Four suggestive modes are presented in detail in the next chapter for retrieval of these workbooks from pick-up points.

There are certain parameters that have to be evaluated before taking any step forward:

- Pick-Up Points Identification
- Vehicle Routing (Route Segregation by dividing into zones)
- Quantity and Weight of workbooks at each pick-up point
- Shredding Methodology and cost

A. Pick-up Points Identification

For the identification of the pick-up points, it is necessary to calculate the number of teaching centres, which act as pick-up points, before 1st March of any particular year. For the Pune city branch of the selected startup, there were 76 teaching centres before 1st March 2017. Also, MS Excel commands were used in tandem, to calculate the number of students associated with each teacher. It was found that there were 279 students enrolled before 1st March 2017. So, the count of teachers makes the pickup point and for Pune its 76 pick-up points from where the workbooks need to be collected.

B. Vehicle Routing

These 76 pick-up points are located in different parts of Pune city. These pick-up points were identified and marked on the map. These were clustered according to their region in such a manner that they get divided into multiple groups. For this, city map and pin codes were used. All the relatively close pick-up points were identified using pin codes and their location on the map and hence they were clubbed together to put under one group.

Here in our case using pin codes and by looking at routes in the map we have categorised various pin codes under the different group (*Appendix 1*). Every particular group should have its own vehicle or same vehicle can be routed on different routes for pickup of workbooks from different pickup points in the route. Using this technique, we have 5 clusters or group and each group has multiple pickup points in it.

Table 1: Pin Code Groups

Group	a	b	c	d	e	Total
Collection Points	13	24	17	13	9	76
Students	61	96	57	36	29	279

C. Quantity of Material to be Retrieve from Each Pick-Up Point

The used workbooks at pick-up point become a load to be picked up and need to be calculated. As per trend, it was identified that it takes on an average 10 months for a student to complete all the workbooks of his/her grade. So, in 300 days on an average, all the workbooks are completed by a student (Entire course structure). Similarly, to calculate the no of workbooks used by a student, it is evaluated using the formula

$$= (31\text{st March} - \text{Joining Date of the Student}) * (\text{Actual no. of Workbooks in that Class} / 300)$$

Table 2: Workbooks

Class	UKG	I	II	III	IV	V	VI	VII	VIII
Workbooks	5	6	6	8	10	11	10	9	10

Where 31st March is chosen on an assumption that school curriculum gets finished by this date for any board for which a student is undertaking exam. There was a total of 279 students that were enrolled in the system and workbooks used by each was calculated.

(e.g., if a student of standard 3rd has completed 30 days of association with the startup, he might have completed 1 workbook)

$$\text{So, } 30 * (8/300) \sim 1 \text{ workbook}$$

Using such calculation, the number of workbooks used by all student for the academic session 2016-2017 was calculated as 1053 workbooks (*Appendix 2*).

D. Calculation of Weight at Each Pick-Up Point

Each workbook weighs around 120 grams. Firstly, we calculated the weight of used workbook associated with each student.

Using the simple formula:

$$= \text{No. of workbooks used} * 0.12 \text{ (in kg)}$$

Now, the weight of used workbooks at each collection point was calculated based on the number of students at each collection points and the weight of all workbooks used by them. (for calculation of logistics costs)

As each teaching centre has multiple students associated with them, hence the weight of the workbooks associated with each student of a particular teaching centre is summed up and this calculates the weight of workbooks available for collection at each pickup point (*Appendix 3*). Using this calculation, it was identified that out of 76 pick-up points, only 2 teaching centres have weight of 8 kg and above available at their place.

E. Shredding Cost of Retrieve Material

The maximum quotation received for scrapping is ₹3/- for each kilogram of weight. Scrap Vendor shall be paying company ₹3/- for each kilogram of weight scrapped and he will be taking away all the shredded papers along with him.

In our case, Weight of workbooks *Price of shredding of single workbook

$$= 126 * 3 = ₹ 378/-$$

VI. REVERSE LOGISTICS METHOD AND COSTING

A suitable vehicle depending upon the weight of the material to be retrieved back has to be hired for every pin-code group or the same vehicle can be re-routed to other pin-code group depending upon the urgency of the material to be brought back. Whenever a particular vehicle has to be assigned to a particular pin-code group, the driver of the vehicle has to be provided with all the relevant information regarding the addresses from where the workbooks have to be picked up.

A. Tendering to Transporters/ Tempo Wala for Collection

Different quotations were received for the collection of workbooks from 76 pick-up points identified. After the quotations were received, a vendor was shortlisted on the basis of rates offered by them as time wasn't a matter of concern for this project. Although, time plays a crucial role for such projects and it depends on the organisation which factors to consider more critical. The cheapest rate identified from all the logistics vendor was ₹250 per pick up point.

The total cost incurred in logistics will be $76 * 250 = ₹ 19,000 /-$

Further shredding cost of materials retrieved has to include. Here, we are receiving money from the scrap vendor by providing him with the shredded material.

So, the cost incurred by the company using this method has 2 parameters under consideration.

Table 3: Cost Sheet Mod A

Particular	Amount
Logistics Cost (a)	₹ 19,000 /-
Shredding Refund (b)	₹ 378 /-
Total Cost (c = a-b)	₹ 18,622 /-

Note: This method is successful for STR (Student-Teacher Ratio) above 6 because weight at each pickup location should be more than 7-8 kg.

B. Hiring a Vehicle for Collection

Another method identified for retrieval of material is quite effective if the city branch of the company is new in its operation. It is effective till the pick-up points are close to each other and their count is less than 50 in any particular city. As the number of teaching centres increases, this method becomes more laborious and tedious in its approach.

A car can be hired through an online medium or any other source. This car is used to roam around the city to collect used workbooks from pick-up points. Selection of car should be done on the basis of weight to collected from each pick-up centre that can be easily fitted into the car. On looking at the website of zoom car it was identified that if a car like Scorpio is hired for 5 days it cost around ₹ 13,500/-. And a driver needs to be hired for 5 days. Hiring a driver will cost around ₹ 5,000/- for 5 days.

(Source: Rates for driver and car are confirmed for 5 days from online websites.)

Further, the cost of oil consumed has to be considered in it. As we have divided Pune region into 5 different zones. On these 5 zones, the vehicle should be routed, supposedly on one Pin-Code group at once. An approximate calculation of the distance is done using google maps for each of the five tracks for both to and fro journey making it a round trip. As it is very difficult to come at exact figures of the kilometres that a car needs to travel for the collection of workbooks from pick-up points because of the extra distance that a car may need to travel while moving in and out of the Pick-up point and other small extra miles that were left uncovered. So, to make this approximation more reliable we are considering a safety margin of 20% for distance calculation on each track.

Table 4: Pin Code Group Distances

Group	a	B	c	d	e	Total Distance
Distance (in Km)	55.2	57.6	79.2	56.4	49.2	297.6

Total distance is calculated by adding the distance obtained from each track. This distance is necessary to calculate the amount of fuel required to travel the distance that a car needs to travel for the collection of workbooks from CTPs place.

Here it is found out that total distance that needs to be travelled is around 298 km.

Considering the mileage of care used in our case to be around 15 km\ltrs.

We have come to conclusion about the cost of petrol required for such activity.

= (Distance / Mileage)*Petrol Price

Table 5: Petrol Cost Mod B

Mileage	15 Km/ltrs
Petrol Required	19.84
Petrol Price	₹ 72.00
Petrol Cost for Total Distance	₹ 1,428.48

So, the cost incurred by the company using this method has 4 parameters under consideration.

Table 6: Cost Sheet Mod B

Parameter	Cost
Vehicle (Rented) (a)	₹ 13,500/-
Driver (Hired) (b)	₹ 5,000/-
Petrol (c)	₹ 1,428/-
Intern (if Company wants to add its cost)	-
Shredding Cost (d)	₹ 378/-
Total Cost (e= a+b+c-d)	₹ 19,550/-

C. Tendering to Hyper-Local Delivery Boys

This method seems to be more effective in the collection of workbooks when on an average each teaching centre has four students associated with it. As in this case, load or weight at each pick-up point will be less than 5 kgs.

Hyper-local delivery boys working with e-commerce or any other delivery services like Swiggy can be contacted for collection of workbooks.

Rates charged by them are as follows:

□ 40/- for first 4 km and after that □ 15/- per km

On further negotiation with these delivery boys, a rate of □ 80/- per pick up point was agreed upon for 76 points from where books have to be picked up. In our case, we have 85% (65 out of 76) of the pick-up points weighing less than 3 kg making this method most cost-effective. The total cost incurred in logistics will be $76 \times 80 = \text{□ } 6,080 /-$

So, the cost incurred by the company using this method has 2 parameters under consideration

Table 7: Cost Sheet Mod C

Parameter	Cost
Logistics (a)	□ 6,080/-
Shredding Cost (b)	□ 378/-
Total Cost (c= a-b)	□ 5,702/-

D. Online Kabadiwala

There are various online vendors that buy scrap and gives monetary returns for buying the same. Although, this method is very easy to implement but it needs a minimum of 15 kg weight to be present at each pickup point. This is a must clause by online Kabadiwala to visits any pick-up point. Websites of many online scrap collectors were searched (like junkart, sellwaste, thekabadiwala etc) and all of them have a condition to have a minimum 15 kg weight to be present at each pickup point. Saying in terms of workbooks: Each Pickup point should have at least 125 workbooks present. As they make a weight of = $125 \times 12 = 15 \text{ kg}$

In our case for Pune city branch of the startup, only one teacher was having the weight of these workbooks available at her destination to be above 15 kg. So, the success of this method is only possible if on an average there are 10 students associated at each pick-up point or teaching centre.

Moreover, these vendors would be paying in return of the scrap a value of □ 9 per kg.

The only concern here is about the copyright issue because we are not assured about the shredding of the workbooks. There can be a misuse of these workbooks as well that can give rise to the unauthorised publishing of company's copyright material. There should be an adept mechanism to void any malpractices that can arise while using this methodology.

VII. CONCLUSION

Although we have discovered four methods that can be used in the collection of workbooks from various pick-up points but there should be a proper understanding about which method is more suitable under give conditions of weight, time and distance of pick-up points with each other. In our case, third mode seems to be more effective as we have average weight less than two kilograms at each pick-up point. But, as the startup grows and the average number of students increases at each pick-up point, other methods will become more cost effective for reverse logistics of the workbooks.

In a nutshell, there should be an error-free calculation of the total load to be collected from each pick-up point to decide upon the possible modes of logistics that can be selected for collection of goods from pick-up points. After this, the trade-off should be performed between the cost of logistics of each mode with respect to the response time in bringing back goods from pick-up points. Although, company's business objectives play a key role in the selection of logistics mode. Sometimes

organisations want to be quicker in response, and ready to bear additional cost arising out of highly responsive logistics system, and sometimes organisations want to be cost-effective and ready to compromise on cost.

A person must be assigned by the organisation and he shall be held accountable for the complete execution of this project. He should be in proper contact and coordination with the point of contact at each pick-up point and logistics person involved while executing such project.

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A UTHOR(S) PROFILE



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Appendix

Table 8: Appendix 1

Pin Code	Pick-Point	Group	Students	Pin code	Pick-Point	Group	Students	Pin code	Pick-Point	Group	Students
411001	1	a	3	411027	3	d	13	411047	1	c	3
411004	1	a	4	411028	7	a	46	411048	3	b	20
411006	2	c	2	411029	1	b	4	411051	1	b	1
411007	3	c	16	411033	1	d	4	411052	2	b	12
411014	3	c	18	411036	1	a	2	411057	6	e	16
411015	6	c	14	411037	3	b	5	411058	1	b	5
411016	1	a	3	411038	5	b	16	411060	2	b	7
411017	4	d	8	411040	3	b	18	411061	1	d	1
411018	1	d	1	411041	2	b	6	411062	1	d	2
411019	1	d	3	411044	1	d	4	412207	1	c	1
411020	1	c	3	411045	2	e	5	412307	2	a	3
411021	1	e	8	411046	1	b	2	Total	76		279

Table 9: Appendix 2

Student	Joined on	Duration (in days)	Workbooks Completed	Student	Joined on	Duration (in days)	Workbooks Completed
1	28-02-2017	31	1	141	29-12-2016	92	2
2	28-02-2017	31	1	142	26-12-2016	95	2
3	28-02-2017	31	1	143	22-12-2016	99	2
4	28-02-2017	31	1	144	20-12-2016	101	4
5	28-02-2017	31	1	145	19-12-2016	102	2
6	27-02-2017	32	1	146	18-12-2016	103	3
7	26-02-2017	33	1	147	18-12-2016	103	3
8	26-02-2017	33	1	148	18-12-2016	103	3
9	26-02-2017	33	1	149	12-12-2016	109	4
10	25-02-2017	34	1	150	12-12-2016	109	2
11	25-02-2017	34	1	151	06-12-2016	115	2
12	24-02-2017	35	1	152	01-12-2016	120	3
13	24-02-2017	35	1	153	29-11-2016	122	2
14	23-02-2017	36	1	154	25-11-2016	126	4
15	23-02-2017	36	1	155	25-11-2016	126	4
16	23-02-2017	36	1	156	23-11-2016	128	3
17	23-02-2017	36	1	157	21-11-2016	130	3
18	23-02-2017	36	1	158	19-11-2016	132	5
19	23-02-2017	36	1	159	18-11-2016	133	4
20	22-02-2017	37	1	160	17-11-2016	134	3
21	22-02-2017	37	1	161	16-11-2016	135	4
22	22-02-2017	37	1	162	15-11-2016	136	3
23	21-02-2017	38	1	163	14-11-2016	137	4
24	21-02-2017	38	1	164	14-11-2016	137	5
25	20-02-2017	39	1	165	14-11-2016	137	3
26	19-02-2017	40	1	166	12-11-2016	139	5
27	18-02-2017	41	1	167	12-11-2016	139	2
28	18-02-2017	41	2	168	12-11-2016	139	5
29	17-02-2017	42	1	169	11-11-2016	140	5
30	16-02-2017	43	1	170	10-11-2016	141	5
31	16-02-2017	43	1	171	07-11-2016	144	5
32	16-02-2017	43	1	172	07-11-2016	144	3
33	16-02-2017	43	1	173	06-11-2016	145	4
34	16-02-2017	43	1	174	05-11-2016	146	5
35	15-02-2017	44	1	175	04-11-2016	147	4
36	14-02-2017	45	1	176	30-10-2016	152	5
37	13-02-2017	46	1	177	23-10-2016	159	5
38	13-02-2017	46	1	178	17-10-2016	165	3
39	13-02-2017	46	1	179	17-10-2016	165	5
40	13-02-2017	46	1	180	16-10-2016	166	4
41	13-02-2017	46	1	181	14-10-2016	168	3
42	13-02-2017	46	1	182	14-10-2016	168	6
43	13-02-2017	46	1	183	12-10-2016	170	3
44	12-02-2017	47	1	184	07-10-2016	175	5
45	12-02-2017	47	1	185	06-10-2016	176	3
46	10-02-2017	49	2	186	06-10-2016	176	4
47	10-02-2017	49	1	187	02-10-2016	180	4
48	09-02-2017	50	1	188	01-10-2016	181	5
49	09-02-2017	50	2	189	29-09-2016	183	4
50	09-02-2017	50	1	190	25-09-2016	187	6
51	09-02-2017	50	2	191	23-09-2016	189	6
52	08-02-2017	51	1	192	22-09-2016	190	4
53	08-02-2017	51	2	193	20-09-2016	192	6
54	08-02-2017	51	1	194	19-09-2016	193	6
55	08-02-2017	51	1	195	17-09-2016	195	7
56	08-02-2017	51	1	196	17-09-2016	195	7
57	07-02-2017	52	1	197	17-09-2016	195	7
58	07-02-2017	52	1	198	16-09-2016	196	7
59	07-02-2017	52	2	199	14-09-2016	198	5
60	07-02-2017	52	2	200	14-09-2016	198	7
61	07-02-2017	52	1	201	09-09-2016	203	7
62	06-02-2017	53	1	202	09-09-2016	203	3
63	06-02-2017	53	2	203	06-09-2016	206	8
64	06-02-2017	53	2	204	06-09-2016	206	8
65	06-02-2017	53	2	205	06-09-2016	206	7

66	06-02-2017	53	2	206	06-09-2016	206	5
67	05-02-2017	54	1	207	02-09-2016	210	4
68	05-02-2017	54	1	208	02-09-2016	210	4
69	05-02-2017	54	2	209	02-09-2016	210	6
70	05-02-2017	54	2	210	02-09-2016	210	4
71	04-02-2017	55	2	211	01-09-2016	211	4
72	04-02-2017	55	1	212	27-08-2016	216	6
73	03-02-2017	56	1	213	16-08-2016	227	8
74	03-02-2017	56	1	214	09-08-2016	234	5
75	03-02-2017	56	1	215	09-08-2016	234	8
76	02-02-2017	57	1	216	08-08-2016	235	5
77	02-02-2017	57	2	217	07-08-2016	236	5
78	02-02-2017	57	1	218	06-08-2016	237	5
79	02-02-2017	57	2	219	03-08-2016	240	5
80	02-02-2017	57	2	220	02-08-2016	241	6
81	02-02-2017	57	2	221	01-08-2016	242	8
82	01-02-2017	58	1	222	01-08-2016	242	9
83	01-02-2017	58	1	223	31-07-2016	243	5
84	31-01-2017	59	2	224	29-07-2016	245	5
85	31-01-2017	59	2	225	27-07-2016	247	4
86	31-01-2017	59	1	226	24-07-2016	250	5
87	31-01-2017	59	1	227	18-07-2016	256	7
88	30-01-2017	60	2	228	11-07-2016	263	10
89	30-01-2017	60	2	229	05-07-2016	269	9
90	30-01-2017	60	1	230	01-07-2016	273	9
91	29-01-2017	61	2	231	01-07-2016	273	9
92	29-01-2017	61	2	232	30-06-2016	274	7
93	29-01-2017	61	1	233	29-06-2016	275	6
94	28-01-2017	62	1	234	27-06-2016	277	6
95	27-01-2017	63	1	235	26-06-2016	278	9
96	27-01-2017	63	1	236	26-06-2016	278	9
97	27-01-2017	63	2	237	25-06-2016	279	6
98	27-01-2017	63	1	238	24-06-2016	280	8
99	27-01-2017	63	2	239	23-06-2016	281	10
100	27-01-2017	63	1	240	19-06-2016	285	10
101	25-01-2017	65	2	241	19-06-2016	285	10
102	25-01-2017	65	1	242	18-06-2016	286	6
103	25-01-2017	65	2	243	16-06-2016	288	10
104	25-01-2017	65	2	244	16-06-2016	288	6
105	24-01-2017	66	2	245	16-06-2016	288	10
106	24-01-2017	66	1	246	15-06-2016	289	10
107	24-01-2017	66	1	247	13-06-2016	291	9
108	24-01-2017	66	1	248	11-06-2016	293	10
109	23-01-2017	67	1	249	08-06-2016	296	6
110	23-01-2017	67	2	250	07-06-2016	297	11
111	21-01-2017	69	2	251	07-06-2016	297	6
112	20-01-2017	70	1	252	03-06-2016	301	6
113	20-01-2017	70	2	253	03-06-2016	301	6
114	18-01-2017	72	1	254	01-06-2016	303	10
115	16-01-2017	74	2	255	31-05-2016	304	6
116	15-01-2017	75	2	256	31-05-2016	304	5
117	15-01-2017	75	3	257	28-05-2016	307	8
118	14-01-2017	76	3	258	27-05-2016	308	9
119	12-01-2017	78	1	259	24-05-2016	311	8
120	11-01-2017	79	1	260	18-05-2016	317	12
121	10-01-2017	80	3	261	17-05-2016	318	8
122	10-01-2017	80	3	262	17-05-2016	318	6
123	10-01-2017	80	1	263	10-05-2016	325	9
124	09-01-2017	81	3	264	07-05-2016	328	11
125	09-01-2017	81	2	265	05-05-2016	330	10
126	07-01-2017	83	2	266	05-05-2016	330	7
127	06-01-2017	84	2	267	27-04-2016	338	12
128	06-01-2017	84	3	268	27-04-2016	338	12
129	05-01-2017	85	3	269	25-04-2016	340	7
130	04-01-2017	86	2	270	25-04-2016	340	7
131	04-01-2017	86	2	271	22-04-2016	343	11
132	04-01-2017	86	2	272	22-04-2016	343	11
133	04-01-2017	86	2	273	22-04-2016	343	11
134	03-01-2017	87	2	274	22-04-2016	343	10

135	03-01-2017	87	1	275	22-04-2016	343	7
136	02-01-2017	88	2	276	22-04-2016	343	9
137	02-01-2017	88	2	277	22-04-2016	343	11
138	02-01-2017	88	1	278	22-04-2016	343	9
139	02-01-2017	88	1	279	22-04-2016	343	11
140	30-12-2017	91	3	Total			1053

Table 10: Appendix 3

Pick-Up Point	Students	Weight at Pick-Up Point (in Kg.)	Pick-Up Point	Students	Weight at Pick-Up Point (in Kg.)
1	8	5.2148	40	8	3.8652
2	5	4.2884	41	1	0.104
3	9	5.942	42	3	2.5788
4	13	8.0768	43	3	0.9176
5	6	2.8752	44	1	0.066
6	5	1.09	45	21	20.3472
7	1	0.584	46	1	0.4384
8	2	0.222	47	1	0.132
9	1	0.062	48	2	0.2228
10	6	4.168	49	2	0.3044
11	6	0.6572	50	2	0.402
12	4	1.4508	51	3	1.544
13	3	0.7268	52	2	0.214
14	1	0.4788	53	2	0.3676
15	3	1.962	54	7	1.1628
16	2	1.3504	55	4	0.848
17	1	0.6696	56	4	1.9688
18	11	6.7624	57	3	0.4156
19	8	7.986	58	3	1.3944
20	8	1.3008	59	2	0.48
21	2	2.1952	60	1	0.126
22	1	0.244	61	1	1.14
23	5	1.0224	62	5	1.4132
24	2	0.4816	63	4	0.534
25	1	0.158	64	7	2.5568
26	3	0.7932	65	1	0.072
27	4	1.402	66	2	0.1512
28	1	0.1728	67	2	0.3416
29	3	0.7684	68	2	0.7248
30	2	0.9232	69	1	0.19
31	9	2.2816	70	3	0.3728
32	1	0.576	71	2	1.3376
33	4	0.7916	72	3	0.326
34	4	3.1432	73	1	0.3264
35	3	0.564	74	1	0.4224
36	1	0.198	75	4	1.7796
37	4	0.444	76	9	4.2056
38	1	0.16	Total	279	126.3096