

Toyota case assignment



**ASSIGN
BUSTER**

Toyota Motor Manufacturing, Indiana, Inc. (TMMI) manufactures Toyota's first full-size truck. In order to make TMMI as profitable as possible, there are a couple of fundamental logistical processes that had to be defined. An important decision that had to be made was the use of appropriate shipping containers for the delivery of parts and materials from suppliers. TMMI has the following three alternatives: 1. Expendable containers with post-use recycling, 2. Expendable containers with post-use disposal, 3. Returnable containers. The logistical department of TMMI knows that the least cost alternative thus not have to be the best alternative for Toyota on the long run. We were given the assignment of recommending a containerization system for the new truck that will satisfy as many parties as possible. We examined the issue from different point of view and especially considered the consequences for the main suppliers of TMMI, Transfreight, TMMI third-party logistics provider, and the cost for TMMI itself.

To guide the analysis of the three alternatives we made some necessary assumptions. Below you will find a summary of these assumptions:

- Evenly balanced annual production per year is 102, 000 Tundra-trucks.
- Daily production volume is 400 Tundra-trucks.
- Production year covers 51 weeks, 5 days p/wk, for a total of 255 days.
- Differences between expendable and returnable containers only appear in weight, durability, damage protection and cost of container.
- Totes owned by a given supplier must be returned to that same supplier.
- Customer pickups are the same for expendable and returnable containers.

For our analysis we examined the prospective usage of four different common container types and we focused our effort on five key suppliers. In

the next sections we will describe the different alternatives. For each alternative we determined the annual costs incurred by each supplier, Transfreight and TMMI. We combined these calculations to determine the system-wide cost for each alternative. We would like to point out that you will find a clearer version of the calculation in the appendixes. As mentioned before the least cost alternative does not mean the best alternative for Toyota on the long-run.

Therefore we will discuss in section three each alternative's impact on the following aspects: •Product quality •Environment •Supply chain relations •Customer service In section four we will discuss some additional questions that have to be considered before making a final decision. At last we will give a conclusion of our findings and recommendations in section five.

2. Analysis of the three different alternatives

2.1 Alternative 1: Expendable Containers, Recycling This alternative requires suppliers to use expendable corrugated containers for shipping parts inbound to TMMI. After that TMMI would gather week's volume of used containers and ship them to a recycler location, Mercury Grissom of Mitchell, Indiana. In the table 1 below you can find the number of containers used each year by Toyota and its five suppliers, including their five-day buffer of containers for each part. In table 2 on the next page you can find the annual usage level of each container per supplier.

Supplier	Parts	Pieces	Pieces	Pieces	Containers	Containers	No of Buffer
Containers	Total	type					
p/truck	p/day	p/container	p/day	p/day	Containers	p/yr	Containers
Container	Blue						
grass Industries	Shocks	416	0082	002001	100051	100052	0003
Steering							
column	140058	080400	204002	08003			

Steering wheel14005808040020400208003

Lugnuts249600100969648024480249601 Blues, IncStereo

system14008505025012750130003 Stereo speakers4160012133,

333333313467034170348404 Kentucky IndustriesInstrument panel

molding1400508840204020801 Interior quarter trim28006133,

333333313467034170348402 Interior door handles28001266,

666666676733517085174202 Exterior door mirror28006133,

333333313467034170348403 Interior rearview mirror14003212,

51365331533803 Missouri IndustriesOver-fender plastic4160012133,

333333313467034170348404 Glove box1400410010050025500260004

Center console1400410010050025500260003

Fuel tank protector1400202020100510052003 Fuel tank cap14001233,

3333333334170867088402 Reds, IncFront grill14005808040020400208004

Passenger side airbag1400410010050025500260003 Shoulder-strap

seatbelts28006133, 333333313467034170348402 Table 1: Total containers

per year SupplierType container1234 Parts Blue grass IndustriesShocks

52000 Steering column 20800 Steering wheel 20800 Lugnuts24960 Total per

type24960 93600 Blues, IncStereo system 13000 Stereo speakers 34840

Total per type 1300034840 Kentucky IndustriesInstrument panel

molding2080 Interior quarter trim 34840 Interior door handles 17420

Exterior door mirror 34840 Interior rearview mirror 3380 Total per

type20805226038220 Missouri IndustriesOver-fender plastic 34840 Glove

box 26000 Center console 26000 Fuel tank protector 5200 Fuel tank cap

8840 Total per type 88403120060840 Reds, IncFront grill 20800 Passenger

side airbag 26000 Shoulder-strap seatbelts 34840 Total per type

<https://assignbuster.com/toyota-case-assignment/>

348402600020800 TOTAL PER TYPE p/yr 2704095940202020116480 Table 2: total containers per type per year Annual costs Suppliers for alternative one The suppliers are also responsible for handling the containers once they are received from the manufacturer of corrugated boxes.

Each supplier receives 255 shipments per year. Each supplier has one employee to take care of this handling, which takes twenty minutes per shipment. The wage per hour of these employees could not be established. We made the assumption that these employees will earn \$22.61 per hour. This is the same amount that material handlers earn at TMMI. You can find the calculation of the annual costs per supplier in appendix 3. Below you will find a summary of the total annual costs of each supplier. Total Cost Supplier Blue grass Industries\$70.936, 25 Blues, Inc\$82.620, 65 Kentucky Industries\$53.57, 65 Missouri Industries\$152.784, 25 Reds, Inc\$79.209, 45 Total annual costs suppliers\$438.908, 25 Table 4: Summary of total cost per supplier Annual costs Transfreight for alternative one

Supplier	Mileage	Shipments	cost	Shipments Total to TMMI	p/d to TMMI	p/mile	p/yr	Costs (\$)																								
Blue grass Industries	1923	1, 30	255	\$190.944	00	Blues, Inc	1743	1, 30	255	\$173.043	00	Kentucky Industries	1703	1, 30	255	\$169.065	00	Missouri Industries	1953	1, 30	255	\$193.927	50	Reds, Inc	2232	1, 30	255	\$147.849	00	Total annual costs for Transfreight	\$874.828	50

Table 4: annual costs Transfreight Annual differentiable costs incurred by TMMI for alternative one TMMI has to consider the following differentiable costs:

- The cost of retrieving, baling and loading the used containers,
- The value of damaged products due to poor handling or improper packaging,
- Outbound transportation to the recycler location. Appendix 4 provides the

<https://assignbuster.com/toyota-case-assignment/>

specific calculations of these differentiable costs. This appendix will also provide the calculation of the revenue from the recycling of the expendable containers. Table 5 gives a summary of the total differentiable costs incurred by TMMI.

Total annual costs for TMMI 1. The cost of retrieving, baling and loading the used containers \$368,995, 20 2. The value of damaged products due to poor handling or improper packaging \$6,513,975, 00 3. Outbound transportation to Recycler location \$20,400, 00 \$6,903,370, 20 minus Total revenue from recycling -\$15,402, 00 Total annual costs for TMMI \$6,887,968, 20 Table 5: summary of annual differentiable costs incurred by TMMI System-wide cost for alternative one Annual costs suppliers \$438,908, 25 Annual costs Transfreight \$874,828, 50 Annual costs TMMI \$6,887,968, 20

=====

System-wide cost for alternative 1 \$8,201,704, 95 Table 6: system-wide cost for alternative 2 2.2 Alternative 2: Expendable Containers, Disposal This alternative is almost the same as alternative 1. The annual costs for suppliers and Transfreight will stay the same if Toyota decides to implement this alternative. The difference will appear in the annual costs incurred by TMMI. The third differentiable cost that is described in the section above will change. Under this alternative TMMI will not sell their used containers to a recycler, but this option for TMMI's weekly disposal of the materials at a landfill.

The amendments on the differentiable costs incurred by TMMI are shown in Appendix 5. Below you can find the system wide cost of alternative two.

System-wide costs for alternative two Total annual costs suppliers \$438. 908, 25 Total annual costs Transfreight\$874. 828, 50 Total annual costs TMMI\$6. 909. 133, 20 ===== Total system-wide costs for alternative 2 \$8. 222. 869, 95 Table 6: system-wide cost for alternative 2 2. 3

Alternative 3: Returnable Containers This alternative is the one with the returnable containers. It is expected that these containers have a life-time of three years.

The supplier is supposed to buy the containers and they will bill Toyota for the costs of buying the containers. Annual costs incurred by TMMI To determine the annual costs for TMMI we need the following costs: •Cycle totes costs: The amount of containers that need to be bought are calculated with the following formula. $\text{Cycle totes} = (\text{part usage/day}) \times (\text{days in shipping loop}) (\text{pieces/container})$ Because of the possibility of damage and losses there has to be a five percent top up calculated. The calculation of these cycle totes is shown in Appendix 6. •Outside carrier: About once a week an outside carrier is hired.

The cost for this outside carrier is \$800 per week. •Employee costs: TMMI has to hire 6 employees to handle the material. Their wage per hour is \$22, 61 for a 40 hour work week, 51 weeks a year. •Annual costs of damaged goods. Appendix 7 provides the calculation of these costs. With the above information with calculated the annual costs for TMMI shown in table 7. cycle totes costs\$209. 388, 00 outside carrier\$40. 800, 00 employee costs\$276. 746, 40 Damaged goods\$3. 474. 120, 00 \$4, 001, 054. 40 Table 7: annual costs for TMMI Annual costs Transfreight The total annual costs for Transfreight are calculated in the table below.

Route Cumulative Shipments cost Shipments Total Mileage/d to TMMI p/mile
 p/yr Costs (\$) Route 14483 1, 00 255\$342. 720, 00 Route 23873 1, 00
 255\$296. 055, 00 Route 34462 1, 00 255\$227. 460, 00 Total annual costs for
 Transfreight \$866. 235, 00 Table 7: Annual costs for Transfreight, TMMI's
 third-party logistics provider Annual Costs for Supplier The total annual costs
 are shown in table total hours wagecosts wages costs wagesno of hours
 neededcosts containertotal annual costs needed
 p/dayp/hp/dayp/yrcontainers per container cleaning p/yrper supplier 1, 5\$17,
 50 \$26, 25 \$6. 93, 75 26760, 05\$2. 341, 50\$9. 035, 25 1, 5\$19, 38 \$29, 07
 \$7. 412, 85 11120, 05\$1. 077, 53\$8. 490, 38 1, 5\$16, 25 \$24, 38 \$6. 215, 63
 22970, 05\$1. 866, 31\$8. 081, 94 1, 5\$15, 94 \$23, 91 \$6. 097, 05 22910,
 05\$1. 825, 93\$7. 922, 98 1\$20, 00 \$20, 00 \$5. 100, 00 18310, 05\$1. 831,
 00\$6. 931, 00 \$40. 461, 54 Table 8: Annual costs for suppliers System-wide
 cost for alternative three Total annual supplier costs \$40. 461, 54 Total
 annual Transfreight costs\$866. 235, 00 Total annual TMMI costs\$4. 867. 289,
 40 \$5. 773. 985, 94 Table 9: System-wide cost for alternative three 3.

Qualitative issues Impact on the environment: Alternative 2 has the worst
 influence on the environment of the three options. -Alternative 3 is the best
 option when it comes to environment. Impact on product quality: -Alternative
 three is the best option when it comes to product quality. The containers of
 option 3 are very firm. Damage cost will be Impact on supply chain relations:
 -Although a lot of suppliers and Transfreight have a problem with the
 reusable containers it is a much cheaper option for them. They will have to
 invest time and money, but it will be the most profitable on the long run.
 Impact on customer service: If Toyota chooses to implement alternative 3
 they are in risk to loose their two main customers. They have to be sure that

their customer service is at a high quality as soon as they decide to change their containers. If they will provide clear information about possible changes they will reduce the complaints from their customers. If these customers feel they are understood they will be more willing to cooperate. -As far as we are aware there is no further influence on customer service. 4. Additional questions 1)De stakeholders are the suppliers, Transfreight , the customers and TMMI .

Transfreight is not excited about the returnable containers. They think they will have to spend too much time with loading and unloading the empty containers. The suppliers also don't like the idea. This is mainly because they don't have the space to store the containers. Besides that, the suppliers think the system with the returnable containers is not cost-and time efficient. The customers are divided. There are customers who already use the returnable containers, but there are also customers who don't use the containers and are against using them.

TMMI is positive about using the returnable containers, especially when they look at the environmental aspect. But they want to make calculations of the costs before deciding what they are going to do. 2)The big advantage of the returnable containers is that it is the best option for the environment. As you can see in the environmental policy of Toyota, the company is very conscious of there influence on the environment and they try to keep their influence to a minimal. Returnable containers are cheaper than regular containers.

The negative side of the returnable containers is that there is a lot of storage room needed. 3) Some people are scared to use the returnable containers because they have been using the old system for such a long time. There are also two main customers of Toyota that may not want to use the returnable containers. People also have the idea that the returnable containers are going to be too expensive. To make the returnable containers a fact, Toyota is going to have to make everyone in the supply chain see that the returnable containers are the best option for everyone, especially financial. .

Conclusion We would recommend the Toyota to use alternative 3. It is the cheapest option, but also has the highest quality. It is the cheapest option for all stakeholders mentioned in section 4: TMMI, the suppliers and Transfreight. Next to that it has a positive influence on the environment and nowadays this is a very important issue. Even though two of the main customers of Toyota are not thrilled with the returnable containers, Toyota should implement this alternative. The company will reduce their logistic costs, this means they can offer their products for a lower price.

On the long run their two main customers will profit from this. By informing their stakeholders with specific information about the returnable containers and the implementation of them, they can convince them of the positive outcomes these returnable containers will have. on the long run. Appendix 1 Appendix 2 Appendix 3 Appendix 4 Appendix 5 Appendix 6

Parts/Pieces	Container Pieces	days in no of truck	cycle	5% at top cost	Total cost/p/yr	Supplied p/truck	type	pep/containers	shipping loop	p/day	to tes	p/unit	p/part
Shocks	4385	5400	1100	1155	\$52, 65	\$60. 810	75	\$20. 270	25	steering	column	1355	75400460483
					\$52, 65	\$25. 29	95	\$8. 476	65	steering			

wheel1355, 75400460483\$52, 65\$25. 429, 95\$8. 476, 65 lugnuts2411005,
5400528555\$29, 49\$16. 366, 95\$5. 455, 65 stereo system1386,
5400325342\$52, 65\$18. 006, 30\$6. 002, 10 stereo speakers44125,
5400733, 33770\$99, 69\$76. 761, 30\$25. 587, 10 instrument panel
molding11507, 54006063\$29, 49\$1. 857, 87\$619, 29 interior quarter
trim2265, 5400733, 33770\$44, 88\$34. 557, 60\$11. 519, 20 interior door
handles22126, 5400433, 33455\$44, 88\$20. 420, 40\$6. 806, 80 exterior door
mirror2366, 5400866, 67910\$52, 65\$47. 911, 50\$15. 970, 50 interior
rearview mirror13327, 540093, 7599\$52, 65\$5. 12, 35\$1. 737, 45 over-
fender plastic44125, 5400733, 33770\$99, 69\$76. 761, 30\$25. 587, 10
glovebox1445, 5400550578\$99, 69\$57. 620, 82\$19. 206, 94 center
console1345, 5400550578\$52, 65\$30. 431, 70\$10. 143, 90 fuel tank
protector13206, 5400130137\$52, 65\$7. 213, 05\$2. 404, 35 fuel tank
cap12126, 5400216, 67228\$44, 88\$10. 232, 64\$3. 410, 88 front grill1455,
75400460483\$99, 69\$48. 150, 27\$16. 050, 09 passenger side airbag1345,
5400550578\$52, 65\$30. 431, 70\$10. 143, 90 shoulder strap seatbelts2265,
5400733, 33770\$44, 88\$34. 557, 60\$11. 519, 20 total cost per year\$209.
388, 00 Appendix 7