



**An application of activity-based costing in the chicken processing industry:
a case of joint products**

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Table S1. The details for the 26 expense categories and resource drivers.

Categories	Explanation	Resource drivers	Measurement unit
1. Staff expenses	Salary, overtime and bonuses paid to the company's staff that routinely works on the production processes.	Working proportion	Percentage
2. Labor expenses	Similar to staff expenses, but labor expenses are only paid to laborers hired to work at the operational level.	No. of laborers	Person
3. Part-time labor expenses	Wages paid daily to temporary labor employed to increase its production capacity.	No. of laborers	Person
4. Fringe benefit expenses	All expenses paid for employees' benefits, such as rewards, social security fund, provident fund, insurance premium, medical fees, and other benefits.	No. of staff and laborers	Person
5. Training expenses	The costs of seminars, workshops, trainings and meetings, paid to improve efficiency and effectiveness of the staff and laborers in both production and supporting activities.	No. of staff and laborers	Person
6. Vehicle expenses	Expenses are, for example, oil, gas, repair and maintenance, vehicle depreciation, car rentals and vehicle fees.	No. of times using the vehicles	Time
7. Water supply expenses	Costs of water that is used for cleaning and washing in the three production activities: slaughtering, cutting, and separation activities.	Water volume	m ³ /month
8. Electricity expenses	Expenses that indicate the amount of electricity that the production activities consume.	No. of machines	Machine
9. Machinery expenses	Depreciation and maintenance expenses for machines and equipment that are used in the production activities.	No. of machines	Machine
10. Promotion expenses	Advertising, public relations, entertainment and other promotion expenses.	Non-allocated	-
11. Communication expenses	Expenses for communication, such as telephone, mobile, fax, network, and postage.	Non-allocated	-
12. Tax & Fee expenses	Expenses paid to the government or individual organizations.	No. of product types	Type
13. Transportation expenses	Expenses paid to a third party hired to transfer the products to storage in the rental warehouse that is located in other area far from the company.	Quantity of the product	Kilogram
14. Shipping expenses	Shipping costs and others paid for transferring the products abroad.	No. of orders	Order
15. Inspection expenses	Resources consumed to ensure the quality of products.	No. of QC tests	Time
16. Cleaning expenses	Costs of cleaning materials for cleaning the equipment, floor, machines and other items that are manufactured.	No. of cleaners	Person
17. Office and other supplies expenses	Expenses paid to mainly support administrative work.	No. of staff	Person
18. Supplies used expenses	Expenses paid for supplies used in the main production process, such as gloves, bags and caps.	No. of laborers	Person
19. Amortized expenses	An amortization of the costs of intangible assets regarding their useful life.	No. of product types	Type
20. Warehouse rental expenses	Expenses to have enough space to store the company's products as sometimes the production capacity is beyond the company's available storage area.	Quantity of products	Kilogram
21. Other asset rental expenses	Expenses incurred for other assets that are separate from the warehouse rental. These assets include the computer equipment that is primarily used at an administrative level.	Non-allocated	-

22. Office building expenses	Depreciation of property, buildings and related systems, such as electricity and water.	Area used in slaughter house	m ²
23. Furniture expenses	Depreciation of furniture and maintenance expenses for furniture.	Non-allocated	-
24. Externally forced expenses	Expenses paid to labor agencies that recruit temporary workers only for the cut separation activities.	Working hours	Hour
25. Commission to the third party	Expenses paid to reward the party for supplying labor to the production process.	No. of laborers	Person
26. Shuttle for labor expense	Expenses paid to provide transportation for labor at the production level.	No. of laborers	Person

Table S2. Assigning resource costs to the activities that are presented in the EAD matrix (unit for allocated costs: one thousand USD).¹

No	Expense categories	Activities									
		1	2	3	4	5	6	7	8	9	
		Marketing and Selling	Ordering and planning	Slaughtering	Cutting	Cut-up-product separation	Checker weigh	Packing and weighing	Vacuum packing and metal detection	Chilling	
1	Staff expenses	Cons. rate	0.0211	0.1053	0.2105	0.2105	0.2632	0.0316	0.0211	0.0526	0.0105
		Alloc. costs	87.2	436.4	872.8	872.8	1,091	130.9	87.3	218.2	43.6
2	Laborer expenses	Cons. rate			0.3396	0.2512	0.2170	0.0303	0.0184	0.0526	0.0139
		Alloc. costs			1,588.7	1,175.2	1,015	141.7	85.9	246.2	65
3	Part-time laborer expenses	Cons. rate			0.3396	0.2512	0.2170	0.0303	0.0184	0.0526	0.0139
		Alloc. costs			2,177.5	1,610.9	1,391.2	194.2	117.8	337.5	89.1
4	Fringe benefit expenses	Cons. rate	0.0022	0.0277	0.3008	0.2225	0.1922	0.0268	0.0163	0.0466	0.0123
		Alloc. costs	4.7	59.1	641.3	474.4	409.7	57.2	34.7	99.4	26.3
5	Training expenses	Cons. rate	0.0022	0.0277	0.3008	0.2225	0.1922	0.0268	0.0163	0.0466	0.0123
		Alloc. costs	0.9	11.6	125.7	93	80.3	11.2	6.8	19.5	5.1
6	Vehicle expenses	Cons. rate	0.0636								
		Alloc. costs	29.3								
7	Water supply expenses	Cons. rate			0.8764	0.0731	0.0505				
		Alloc. costs			47.2	3.9	2.7				
8	.....	.....	...	...	...	...	...	...	...	...
...	
Total costs (thousand US\$)			154.5	691.8	8,560.2	5,215.1	7,114.7	703.8	460.2	1,630.3	1,907.1
Total amount of activity driver			76	136	137,662,563	370,614,669	487,782,519	66,108,007	71,234,723	3,645,994	67,588,729
Activity rate (\$ per unit)			2,033	5,086.85	0.0622	0.0141	0.0146	0.0106	0.0065	0.4472	0.0282

Table S2 (continued). Assigning resource costs to the activities that are presented in the EAD matrix (unit for allocated costs: one thousand USD).

No	Expense categories	Activities								Costs pool for non-allocated proportion	Total
		10	11	12	13	14	15	16			
		Freezing	Storage in the warehouse	Domestic products process	Delivery-out	Administrative and supporting	Waste water treatment	Customer service			
1	Staff expenses	Cons. rate	0.0105	0.0105	0.0105	0.0105	0.0105	0.0105	0.0105		1
		Alloc. costs	43.6	43.6	43.6	43.6	43.6	43.6	43.6		4,146
2	Laborer expenses	Cons. rate	0.0323	0.0174	0.0218			0.0055			1
		Alloc. costs	151	81.3	102.2			25.5			4,677.7
3	Part-time laborer expenses	Cons. rate	0.0323	0.0174	0.0218			0.0055			1
		Alloc. costs	206.9	111.4	140.1			35			6,411.6
4	Fringe benefit expenses	Cons. rate	0.0286	0.0154	0.0193	0.0079	0.0730	0.0066	0.0018		1
		Alloc. costs	60.9	32.8	41.3	16.9	155.6	14.1	3.8		2,132.1
5	Training expenses	Cons. rate	0.0286	0.0154	0.0193	0.0079	0.0730	0.0066	0.0018		1
		Alloc. costs	11.9	6.4	8.1	3.3	30.5	2.7	0.7		418
6	Vehicle expenses	Cons. rate					0.9255	0.0011	0.0098		1
		Alloc. costs					426.2	0.5	4.5		460.4
7	Water supply expenses	Cons. rate									1
		Alloc. costs									53.8
8	...	...	...	...	...	...	...	...	...	...
...	
Total costs (thousand US\$)			2,493.7	665	953.8	5,292.1	1,304	1,034.2	71.2		
Total amount of activity driver			3,645,994	3,645,994	64,651,771	3,645,994	136	137,662,563	76		
Activity rate (\$ per unit)			0.6840	0.1824	0.0148	1.45	9,587.92	0.0075	936.58		

¹ Cons. Rate = consumption rate; Alloc. rate = allocation rate.

Table S3. The activity product dependence matrix showing the amount of activity consumed by some products.

No	Activities	1	2	3	4	..	18	19	20	21	..	35
		Whole chicken	Leg Bone domestic	Leg Bone frozen	Leg Bone raw material	.....	Skinless breast bone frozen	Fillet domestic	Fillet frozen	Fillet raw material	.....	Wing tip frozen
1	Marketing and Selling		3			..	15	1	2		..	3
2	Ordering and planning	11	7	1	4	..	1	7	2	3	..	2
3	Slaughtering	8,780,184	13,341,974	476,928	2,470,797	..	48,504	1,760,520	430,368	4,696,347	..	884,816
4	Cutting		43,023,040	1,537,920	7,967,427	..	114,314	14,297,493	3,495,094	38,139,856	..	2,085,337
5	Cutting and separation		72,369,119	2,586,938	13,402,020	..	238,584	11,776,026	2,878,708	31,413,615	..	3,918,178
6	Checker weigh			476,928	2,470,797	..	48,504				..	884,816
7	Packing and weighting			476,928	2,470,797	..	48,504		430,368	4,696,347	..	884,816
8	Vacuum packing and metal detection			476,928		..	48,504		430,368		..	884,816
9	Chilling				2,470,797	..				4,696,347	..	
10	Freezing			476,928		..	48,504		430,368		..	884,816
11	Storing in the warehouse			476,928		..	48,504		430,368		..	884,816
12	Domestic product processes	8,780,184	13,341,974			..		1,760,520			..	
13	Delivery-out			476,928		..	48,504		430,368		..	884,816
14	Administration & support	11	7	1	4	..	1	7	2	3	..	2
15	Waste water treatment	8,780,184	13,341,974	476,928	2,470,797	..	48,504	1,760,520	430,368	4,696,347	..	884,816
16	Customer service		3			..	15	1	2		..	3

Table S4. An example of the overhead cost calculation for the fillet products.

Activities	Domestic fillet products			Frozen fillet products			Raw material fillet products		
	Activity consumption	Activity rate	Cost of consumption	Activity consumption	Activity rate	Cost of consumption	Activity consumption	Activity rate	Cost of consumption
Marketing and selling	1	2,033	2,033.00	2	2,033	4,066	–	–	–
Ordering and planning	7	5,086.85	35,607.95	2	5,086.85	10,174	3	5,086.85	15,261
Slaughtering	1,760,520	0.0622	109,504.34	430,368	0.0622	26,769	4,696,347	0.0622	292,113
Cutting	14,297,493	0.0141	201,594.65	3,495,094	0.0141	49,281	38,139,856	0.0141	537,772
Cutting and separation	11,776,026	0.0106	124,825.88	2,878,708	0.0146	42,029	31,413,615	0.0146	458,639
Checker weigh	–	–	–	–	–	–	–	–	–
Packing and weighting	–	–	–	430,368	0.0065	2,797	4,696,347	0.0065	30,526
Vacuum packing and metal detection	–	–	–	430,368	0.4472	192,461	–	–	–
Chilling	–	–	–	–	–	–	4,696,347	0.0282	132,437
Freezing	–	–	–	430,368	0.6840	294,372	–	–	–
Storing in the warehouse	–	–	–	430,368	0.1824	78,499	–	–	–
Domestic product processes	1,760,520	0.0148	26,055.70	–	–	–	–	–	–
Delivery-out	–	–	–	430,368	1.4500	624,034	–	–	–
Administration and support	7	9,587.92	67,115.44	2	9,587.92	19,176	3	9,587.92	28,764
Waste water treatment	1,760,520	0.0075	13,203.90	430,368	0.0075	3,228	4,696,347	0.0075	35,223
Customer service	1	936.58	936.58	2	936.58	1,873	–	–	–
Total overhead cost (\$)			580,877.44			1,348,758			1,530,734
Total number of the product (kg)			1,760,520			430,368			4,696,347
Overhead cost per unit (\$/kg)			0.3299			3.13			0.3259