

FIT5160 Business Process Modelling, Design and Simulation

Semester 2, 2019

Assignment 2 Scenario¹ – Business Process Evaluation @ HAS²

From the first stage business process analysis and evaluation, James and the management team have confirmed the current business process flow chart you have produced. The finalised flow chart appears in Appendix 1. According to your preliminary analysis, the current business process seems to be not very efficient and effective. In addition, HAS management is concerned with the utilisation of their available and limited resources, and HAS's financial health. Thus, James and the HAS senior management team decided to investigate this further, and employed your team as the process-improvement team to study this problem in more detail. The process might be redesigned as a result of your team's recommendations.

In this second stage, the HAS management wants your team to build simulation models that will allow them to better visualise the business process and evaluate various performance measures. Another meeting has been held with James and the HAS management where they detailed the nature of the HAS's current operations to your team. The area that the HAS management wants help with is improving HAS's business process in terms of reducing average cycle time (from both customers' and business' perspective), increasing resources utilisation, and improving financial health (i.e., break even, maximising cash flows, while avoiding excessive financial risk).

To simplify the scenario, HAS management only considers seven categories of animals: wildlife, cats, kittens, dogs, puppies, rabbits, and bunnies. HAS receives different animals from various sources according to a Poisson distribution. It is estimated that HAS will receive 11,680 animals in total per year. However, the proportions of different animals arriving HAS and their adoption/donation fees are different, as shown in Table 1 below. The animal adult-to-young ratio is 3:2 across all animal types; and all animals have a 50:50 gender ratio.

Table 1. Arrival Animal Proportion, and Respective Adoption/Donation Fee

Animal Category	Arrival Proportion	Adoption/Donation Fee per Animal (AUD)
Wildlife	5%	100
Cats	40%	115
Kittens		225
Dogs	30%	400
Puppies		500
Rabbits	25%	80
Bunnies		100

According to the flow chart (see Appendix 1), there are many activities being identified in the current process. Some parameters have already been given in the previous meeting/stage. For those that haven't been previously specified, with the help of the internal staff, HAS management has provided your team with the activity times and their distributions, shown in Table 2.

¹ This scenario is a continuation of Assignment 1 scenario. Please read and use both scenarios in Assignment 2.

² Disclaimer: The content of this scenario is fictitious.

Table 2. Activity Times for the Current HAS Process

Activity No.	Description	Activity Time Distribution	Parameter Values
1	Emergency check & call for vet if needed	Exponential	$\mu = 10$ minutes
2	Transfer to AES (including to and from AES)	Constant	Value = 1 hour
3	Treatment	Exponential	$\mu = 2$ hours
4	Enter information into system	Exponential	$\mu = 30$ minutes
5	Enter information into system & contact vet	Exponential	$\mu = 30$ minutes
6	Health check	Exponential	$\mu = 20$ minutes
7	General treatment	Exponential	$\mu = 0.5$ hours
8, 11, 15, 18, 20, 22	Contact vet	Exponential	$\mu = 5$ minutes
9	Contact partnered wildlife carer (PWC)	Exponential	$\mu = 15$ minutes
10	Transfer to PWC (including to and from PWC)	Constant	Value = 2 days
12	Deworming	Exponential	$\mu = 10$ minutes
13	Search and contact owner	Exponential	$\mu = 1$ hour
14	Transfer to owner (including to and from owner)	Constant	Value = half a day
16	Waiting for the young to grow up	Constant	<ul style="list-style-type: none"> • Kittens: 8 weeks • Puppies: 8 weeks • Bunnies: 4 months
17	Desexing	Exponential	<ul style="list-style-type: none"> • Female: $\mu = 30$ minutes • Male: $\mu = 15$ minutes
19	Receiving vaccine shot ³	Exponential	$\mu = 30$ minutes
21	Microchipping	Exponential	$\mu = 1$ hour
23	Temper checking	Uniform real	<ul style="list-style-type: none"> • Returned: Max = 30 min; Min = 15 min • Non-returned: Max = 15 min; Min = 5 min
24	Contact vet and fill in paperwork	Exponential	$\mu = 30$ minutes
25	Perform euthanasia	Exponential	$\mu = 1$ hour

Customers come to HAS website to apply for pet adoption according to a Poisson distribution with a mean rate of 16 customers per day. Customers' preferences for pet vary between individuals, as shown in Table 3.

Table 3. Customers' Pet Preferences

Animal Category	Customer Preference	Animal Category	Customer Preference
Cats	16%	Kittens	24%
Dogs	12%	Puppies	18%
Rabbits	15%	Bunnies	15%

³ The third vaccine shot has the highest priority; whereas the first vaccine shot has the lowest priority.

According to the flow chart (see Appendix 1), there are many activities being identified in the current customer pet adoption process. Some parameters have already been given in the previous meeting/stage. For those that haven't been previously specified, HAS management has provided your team with the activity times and their distributions, shown in Table 4.

Table 4. Activity Times for the Current Customer Pet Adoption Process

Activity	Description	Activity Time Distribution	Parameter Values
A	Fill in online form	Exponential	μ = half an hour
B	Check background	Exponential	μ = 1 hour • More information needed: 15%
C	Wait for customers to provide more info	Exponential	μ = 2 days
D	Send confirmation email	Exponential	μ = 10 minutes
E	Contact customer	Exponential	μ = 15 minutes
F	Arrange interview	Exponential	μ = 15 minutes
G	Interview with pet and pick up	Exponential	μ = 2 hours
H	Follow-up interview	Exponential	μ = 2 hours

As any other businesses, the HAS management concerns the financial health of HAS's operations. This year, HAS received funding from the Department of the Environment and Energy for helping wildlife especially threatened species, and the large Animal Welfare Fund from the Victoria State Government, totalled AUD 1.9 million. In addition, HAS received ad hoc donations from companies and individual animal lovers, expected to reach AUD 70,000 this year. Another major revenue source for HAS is the animal adoption fees and the wildlife release donations (see Table 1).

On the other hand, it is estimated that the average daily cost of shelter care is 5 Australian dollars per animal; and the HAS management thinks the average number of animals that are ready for adoption per day is an accurate base to calculate daily shelter care cost. In addition, the called-in veterinarians were paid according to their service hours. Normally, the average full-time veterinarian salary in Australia is AUD 96,488 per year or AUD 49.48 per hour (without superannuation). The casual rate is usually 18.97% higher than the full-time rate; hence, with superannuation, the average veterinarian casual rate is around AUD 64.46 per hour. Given HAS is a not-for-profit small organisation, the called-in veterinarians charge a discounted average rate at AUD 57.4 per hour. In addition to the shelter care and vet cost⁴, there is personnel and other fixed cost. The average full-time HAS staff⁵ salary is AUD 50,000 per year (including all superannuation and on-cost⁶). The other fixed cost includes property lease, utilities, and the like, which is about AUD 20,000 per year. As a small not-for-profit organisation, the HAS management would like to see whether HAS will be breaking even at the end of this year, and whether HAS' financial position can be improved as a result of business process improvement/redesign.

⁴ Please note, there is no additional cost for deworming, desexing, vaccination, and microchipping.

⁵ This includes the first-aid team members and the administrative personnel only.

⁶ At HAS, the total of superannuation and on-cost is 15.69% of the base salary.