Appendix

Table 1

Fitness value of potential suppliers by TOPSIS

$$\begin{bmatrix} 0.389, & 0.443, & 0.106, & 0.921, & 0.553, & 0.757, & 0.085, & 0.564, & 0.950, & 0.178, & 0.673, & 0.179, & 0.034, & 0.684, & 0.187 \\ 0.067, & 0.478, & 0.141, & 0.448, & 0.884, & 0.543, & 0.755, & 0.548, & 0.888, & 0.244, & 0.679, & 0.573, & 0.203, & 0.209, & 0.035 \\ 0.623, & 0.421, & 0.105, & 0.662, & 0.891, & 0.600, & 0.624, & 0.217, & 0.382, & 0.739, & 0.482, & 0.894, & 0.869, & 0.098, & 0.995 \\ 0.735, & 0.087, & 0.112, & 0.854, & 0.712, & 0.862, & 0.417, & 0.771, & 0.493, & 0.088, & 0.622, & 0.168, & 0.768, & 0.976, & 0.838 \\ 0.555, & 0.486, & 0.154, & 0.792, & 0.604, & 0.842, & 0.467, & 0.183, & 0.565, & 0.991, & 0.308, & 0.723, & 0.248, & 0.378, & 0.090 \\ 0.173, & 0.946, & 0.821, & 0.896, & 0.925, & 0.986, & 0.035, & 0.995, & 0.129, & 0.507, & 0.915, & 0.236, & 0.803, & 0.657, & 0.483 \\ 0.605, & 0.485, & 0.004, & 0.974, & 0.220, & 0.955, & 0.969, & 0.988, & 0.070, & 0.218, & 0.109, & 0.940, & 0.433, & 0.704, & 0.264 \\ 0.206, & 0.049, & 0.290, & 0.473, & 0.306, & 0.078, & 0.561, & 0.751, & 0.813, & 0.231, & 0.705, & 0.071, & 0.654, & 0.329, & 0.401 \\ 0.214, & 0.418, & 0.324, & 0.109, & 0.649, & 0.771, & 0.004, & 0.585, & 0.239, & 0.831, & 0.199, & 0.689, & 0.104, & 0.024, & 0.974 \\ 0.876, & 0.079, & 0.248, & 0.395, & 0.382, & 0.456, & 0.201, & 0.479, & 0.364, & 0.814, & 0.681, & 0.858, & 0.217, & 0.047, & 0.806 \\ 0.320, & 0.686, & 0.977, & 0.085, & 0.380, & 0.993, & 0.511, & 0.455, & 0.211, & 0.334, & 0.726, & 0.992, & 0.553, & 0.615, & 0.510 \\ 0.192, & 0.883, & 0.513, & 0.403, & 0.257, & 0.451, & 0.451, & 0.406, & 0.595, & 0.717, & 0.868, & 0.232, & 0.236, & 0.354, & 0.708 \\ 0.662, & 0.720, & 0.630, & 0.531, & 0.823, & 0.997, & 0.999, & 0.881, & 0.675, & 0.433, & 0.424, & 0.829, & 0.996, & 0.933, & 0.225 \\ 0.391, & 0.457, & 0.259, & 0.505, & 0.384, & 0.290, & 0.651, & 0.569, & 0.007, & 0.479, & 0.767, & 0.932, & 0.602, & 0.773, & 0.783 \\ 0.731, & 0.146, & 0.030, & 0.405, & 0.438, & 0.348, & 0.241, & 0.626, & 0.484, & 0.864, & 0.030, & 0.105, & 0.330, & 0.040, & 0.628 \end{bmatrix}$$

Table 2

Partial data of simulation case

Material	Supplier	Q	C	T	D
P_1	S_1	0.45	93	7.1	0.28
	S_2	0.41	90	7.5	0.23
	S_3	0.38	96	6.9	0.25
P_2	S_4	0.41	80	4.8	0.36
	S_5	0.46	83	4.3	0.41
	S_6	0.39	87	3.7	0.34
P_3	S_7	0.37	59	5.3	0.47
	S_8	0.41	67	5.5	0.52
	S_9	0.35	63	4.5	0.45
	S_{10}	0.33	54	5.1	0.49
	S_{11}	0.39	60	4.9	0.43
P_{14}	S_{12}	0.44	80	3.9	0.64
	S_{13}	0.35	84	3.5	0.57
	S_{14}	0.38	88	3.7	0.61
	S_{15}	0.39	79	4.3	0.53
P_{15}	S_1	0.25	74	3.1	0.43
	S_2	0.28	77	3.9	0.49
	S_3	0.35	82	3.3	0.45
	S_4	0.31	79	3.7	0.41
	S_5	0.3	83	3.5	0.47

Table 3

Settings of initial parameters in the algorithm

Fusing Algorithm			
GA part		**ACO part**	
Population size	110	Numbers of ants	110
Poor crossover probability	$P_{c_0} = 0.7$	Initial pheromone	0.1
Better crossover probability	$P_{c_1} = 0.3$	Pheromone coefficient	$\alpha = 0.4$
Poor mutation probability	$P_{m_0} = 0.3$	Heuristic coefficient	$b = 8$
Better mutation probability	$P_{m_1} = 0.1$	Pheromone volatilization coefficient	$r = 0.3$
Maximum iteration	$Ge_{\max} = 50$	Randomness coefficient	$s = 0.3$
Minimum iteration	$Ge_{\min} = 5$		
Ge_{die}	3		

Genetic Algorithm		**Ant Colony Optimization**	
Population size	110	Numbers of ants	110
crossover probability	$P_c = 0.7$	Initial pheromone	0.1
mutation probability	$P_m = 0.2$	Pheromone coefficient	$\alpha = 0.4$
Maximum iteration	$Ge_{\max} = 100$	Heuristic coefficient	$b = 8$
		Pheromone volatilization coefficient	$r = 0.3$
		Maximum iteration	$Ac_{\max} = 100$