

Appendix A – ISM factor comparison template

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
F1 – Technical skills & expertise										
1	F1-F2	Technical skills & expertise enhanced entrepreneurial behaviour?								
2	F2-F1	Entrepreneurial behaviour enhanced technical skills & expertise?								
3	F1-F3	Technical skills & expertise enhanced leadership & championing?								
4	F3-F1	Leadership & championing enhanced technical skills & expertise?								
5	F1-F4	Technical skills & expertise enhanced communication?								
6	F4-F1	Communication enhanced technical skills & expertise?								
7	F1-F5	Technical skills & expertise enhanced motivation?								
8	F5-F1	Motivation enhanced technical skills & expertise?								
9	F1-F6	Technical skills & expertise enhanced creativity?								
10	F6-F1	Creativity enhanced technical skills & expertise?								
11	F1-F7	Technical skills & expertise enhanced top management support?								
12	F7-F1	Top management support enhanced technical skills & expertise?								
13	F1-F8	Technical skills & expertise enhanced organisational structures & processes?								
14	F8-F1	Organisational structures & processes enhanced technical skills & expertise?								
15	F1-F9	Technical skills & expertise enhanced organisational culture?								
16	F9-F1	Organisational culture enhanced technical skills & expertise?								
17	F1-F10	Technical skills & expertise enhanced organisational strategy?								
18	F10-F1	Organisational strategy enhanced technical skills & expertise?								
19	F1-F11	Technical skills & expertise enhanced knowledge sharing?								
20	F11-F1	Knowledge sharing enhanced technical skills & expertise?								
21	F1-F12	Technical skills & expertise enhanced teamwork?								
22	F12-F1	Teamwork enhanced technical skills & expertise?								
23	F1-F13	Technical skills & expertise enhanced open innovation?								
24	F13-F1	Open innovation enhanced technical skills & expertise?								
25	F1-F14	Technical skills & expertise enhanced supplier / service provider network?								
26	F14-F1	Supplier / service provider network enhanced technical skills & expertise?								
27	F1-F15	Technical skills & expertise enhanced partner / alliance network?								
28	F15-F1	Partner / alliance network enhanced technical skills & expertise?								
29	F1-F16	Technical skills & expertise enhanced customer needs identification?								
30	F16-F1	Customer needs identification enhanced technical skills & expertise?								
31	F1-F17	Technical skills & expertise enhanced customer involvement?								
32	F17-F1	Customer involvement enhanced technical skills & expertise?								
33	F1-F18	Technical skills & expertise enhanced market analysis?								
34	F18-F1	Market analysis enhanced technical skills & expertise?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
F2 - Entrepreneurial behaviour										
35	F2-F3	Entrepreneurial behaviour enhanced leadership & championing?								
36	F3-F2	Leadership & championing enhanced entrepreneurial behaviour?								
37	F2-F4	Entrepreneurial behaviour enhanced communication?								
38	F4-F2	Communication enhanced entrepreneurial behaviour?								
39	F2-F5	Entrepreneurial behaviour enhanced motivation?								
40	F5-F2	Motivation enhanced entrepreneurial behaviour?								
41	F2-F6	Entrepreneurial behaviour enhanced creativity?								
42	F6-F2	Creativity enhanced entrepreneurial behaviour?								
43	F2-F7	Entrepreneurial behaviour enhanced top management support?								
44	F7-F2	Top management support enhanced entrepreneurial behaviour?								
45	F2-F8	Entrepreneurial behaviour enhanced organisational structures & processes?								
46	F8-F2	Organisational structures & processes enhanced entrepreneurial behaviour?								
47	F2-F9	Entrepreneurial behaviour enhanced organisational culture?								
48	F9-F2	Organisational culture enhanced entrepreneurial behaviour?								
49	F2-F10	Entrepreneurial behaviour enhanced organisational strategy?								
50	F10-F2	Organisational strategy enhanced entrepreneurial behaviour?								
51	F2-F11	Entrepreneurial behaviour enhanced knowledge sharing?								
52	F11-F2	Knowledge sharing enhanced entrepreneurial behaviour?								
53	F2-F12	Entrepreneurial behaviour enhanced teamwork?								
54	F12-F2	Teamwork enhanced entrepreneurial behaviour?								
55	F2-F13	Entrepreneurial behaviour enhanced open innovation?								
56	F13-F2	Open innovation enhanced entrepreneurial behaviour?								
57	F2-F14	Entrepreneurial behaviour enhanced supplier / service provider network?								
58	F14-F2	Supplier / service provider network enhanced entrepreneurial behaviour?								
59	F2-F15	Entrepreneurial behaviour enhanced partner / alliance network?								
60	F15-F2	Partner / alliance network enhanced entrepreneurial behaviour?								
61	F2-F16	Entrepreneurial behaviour enhanced customer needs identification?								
62	F16-F2	Customer needs identification enhanced entrepreneurial behaviour?								
63	F2-F17	Entrepreneurial behaviour enhanced customer involvement?								
64	F17-F2	Customer involvement enhanced entrepreneurial behaviour?								
65	F2-F18	Entrepreneurial behaviour enhanced market analysis?								
66	F18-F2	Market analysis enhanced entrepreneurial behaviour?								
F3 - Leadership & championing										
63	F3-F4	Leadership & championing enhanced communication?								
64	F4-F3	Communication enhanced leadership & championing?								
65	F3-F5	Leadership & championing enhanced motivation?								
66	F5-F3	Motivation enhanced leadership & championing?								
67	F3-F6	Leadership & championing enhanced creativity?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
68	F6-F3	Creativity enhanced leadership & championing?								
69	F3-F7	Leadership & championing enhanced top management support?								
70	F7-F3	Top management support enhanced leadership & championing?								
71	F3-F8	Leadership & championing enhanced organisational structures & processes?								
72	F8-F3	Organisational structures & processes enhanced leadership & championing?								
73	F3-F9	Leadership & championing enhanced organisational culture?								
74	F9-F3	Organisational culture enhanced leadership & championing?								
75	F3-F10	Leadership & championing enhanced organisational strategy?								
76	F10-F3	Organisational strategy enhanced leadership & championing?								
77	F3-F11	Leadership & championing enhanced knowledge sharing?								
78	F11-F3	Knowledge sharing enhanced leadership & championing?								
79	F3-F12	Leadership & championing enhanced teamwork?								
80	F12-F3	Teamwork enhanced leadership & championing?								
81	F3-F13	Leadership & championing enhanced open innovation?								
82	F13-F3	Open innovation enhanced leadership & championing?								
83	F3-F14	Leadership & championing enhanced supplier / service provider network?								
84	F14-F3	Supplier / service provider network enhanced leadership & championing?								
85	F3-F15	Leadership & championing enhanced partner / alliance network?								
86	F15-F3	Partner / alliance network enhanced leadership & championing?								
87	F3-F16	Leadership & championing enhanced customer needs identification?								
88	F16-F3	Customer needs identification enhanced leadership & championing?								
89	F3-F17	Leadership & championing enhanced customer involvement?								
90	F17-F3	Customer involvement enhanced leadership & championing?								
91	F3-F18	Leadership & championing enhanced market analysis?								
92	F18-F3	Market analysis enhanced leadership & championing?								
F4 - Communication										
89	F4-F5	Communication enhanced motivation?								
90	F5-F4	Motivation enhanced communication?								
91	F4-F6	Communication enhanced creativity?								
92	F6-F4	Creativity enhanced communication?								
93	F4-F7	Communication enhanced top management support?								
94	F7-F4	Top management support enhanced communication?								
95	F4-F8	Communication enhanced organisational structures & processes?								
96	F8-F4	Organisational structures & processes enhanced communication?								
97	F4-F9	Communication enhanced organisational culture?								
98	F9-F4	Organisational culture enhanced communication?								
99	F4-F10	Communication enhanced organisational strategy?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
100	F10-F4	Organisational strategy enhanced communication?								
101	F4-F11	Communication enhanced knowledge sharing?								
102	F11-F4	Knowledge sharing enhanced communication?								
103	F4-F12	Communication enhanced teamwork?								
104	F12-F4	Teamwork enhanced communication?								
105	F4-F13	Communication enhanced open innovation?								
106	F13-F4	Open innovation enhanced communication?								
107	F4-F14	Communication enhanced supplier / service provider network?								
108	F14-F4	Supplier / service provider network enhanced communication?								
109	F4-F15	Communication enhanced partner / alliance network?								
110	F15-F4	Partner / alliance network enhanced communication?								
111	F4-F16	Communication enhanced customer needs identification?								
112	F16-F4	Customer needs identification enhanced communication?								
113	F4-F17	Communication enhanced customer involvement?								
114	F17-F4	Customer involvement enhanced communication?								
115	F4-F18	Communication enhanced market analysis?								
116	F18-F4	Market analysis enhanced communication?								
F5 - Motivation										
113	F5-F6	Motivation enhanced creativity?								
114	F6-F5	Creativity enhanced motivation?								
115	F5-F7	Motivation enhanced top management support?								
116	F7-F5	Top management support enhanced motivation?								
117	F5-F8	Motivation enhanced organisational structures & processes?								
118	F8-F5	Organisational structures & processes enhanced motivation?								
119	F5-F9	Motivation enhanced organisational culture?								
120	F9-F5	Organisational culture enhanced motivation?								
121	F5-F10	Motivation enhanced organisational strategy?								
122	F10-F5	Organisational strategy enhanced motivation?								
123	F5-F11	Motivation enhanced knowledge sharing?								
124	F11-F5	Knowledge sharing enhanced motivation?								
125	F5-F12	Motivation enhanced teamwork?								
126	F12-F5	Teamwork enhanced motivation?								
127	F5-F13	Motivation enhanced open innovation?								
128	F13-F5	Open innovation enhanced motivation?								
129	F5-F14	Motivation enhanced supplier / service provider network?								
130	F14-F5	Supplier / service provider network enhanced motivation?								
131	F5-F15	Motivation enhanced partner / alliance network?								
132	F15-F5	Partner / alliance network enhanced motivation?								
133	F5-F16	Motivation enhanced customer needs identification?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
134	F16-F5	Customer needs identification enhanced motivation?								
135	F5-F17	Motivation enhanced customer involvement?								
136	F17-F5	Customer involvement enhanced motivation?								
137	F5-F18	Motivation enhanced market analysis?								
138	F18-F5	Market analysis enhanced motivation?								
F6 - Creativity										
139	F6-F7	Creativity enhanced top management support?								
152	F7-F6	Top management support enhanced creativity?								
153	F6-F8	Creativity enhanced organisational structures & processes?								
154	F8-F6	Organisational structures & processes enhanced creativity?								
155	F6-F9	Creativity enhanced organisational culture?								
156	F9-F6	Organisational culture enhanced creativity?								
157	F6-F10	Creativity enhanced organisational strategy?								
158	F10-F6	Organisational strategy enhanced creativity?								
159	F6-F11	Creativity enhanced knowledge sharing?								
160	F11-F6	Knowledge sharing enhanced creativity?								
161	F6-F12	Creativity enhanced teamwork?								
162	F12-F6	Teamwork enhanced creativity?								
163	F6-F13	Creativity enhanced open innovation?								
164	F13-F6	Open innovation enhanced creativity?								
165	F6-F14	Creativity enhanced supplier / service provider network?								
166	F14-F6	Supplier / service provider network enhanced creativity?								
167	F6-F15	Creativity enhanced partner / alliance network?								
168	F15-F6	Partner / alliance network enhanced creativity?								
169	F6-F16	Creativity enhanced customer needs identification?								
170	F16-F6	Customer needs identification enhanced creativity?								
171	F6-F17	Creativity enhanced customer involvement?								
172	F17-F6	Customer involvement enhanced creativity?								
173	F6-F18	Creativity enhanced market analysis?								
174	F18-F6	Market analysis enhanced creativity?								
F7 - Top management support										
175	F7-F8	Top management support enhanced organisational structures & processes?								
176	F8-F7	Organisational structures & processes enhanced top management support?								
177	F7-F9	Top management support enhanced organisational culture?								
178	F9-F7	Organisational culture enhanced top management support?								
179	F7-F10	Top management support enhanced organisational strategy?								
180	F10-F7	Organisational strategy enhanced top management support?								
181	F7-F11	Top management support enhanced knowledge sharing?								
182	F11-F7	Knowledge sharing enhanced top management support?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
183	F7-F12	Top management support enhanced teamwork?								
184	F12-F7	Teamwork enhanced top management support?								
185	F7-F13	Top management support enhanced open innovation?								
186	F13-F7	Open innovation enhanced top management support?								
187	F7-F14	Top management support enhanced supplier / service provider network?								
188	F14-F7	Supplier / service provider network enhanced top management support?								
189	F7-F15	Top management support enhanced partner / alliance network?								
190	F15-F7	Partner / alliance network enhanced top management support?								
191	F7-F16	Top management support enhanced customer needs identification?								
192	F16-F7	Customer needs identification enhanced top management support?								
193	F7-F17	Top management support enhanced customer involvement?								
194	F17-F7	Customer involvement enhanced top management support?								
195	F7-F18	Top management support enhanced market analysis?								
196	F18-F7	Market analysis enhanced top management support?								
F8 - Organisational structures & processes										
197	F8-F9	Organisational structures & processes enhanced organisational culture?								
198	F9-F8	Organisational culture enhanced organisational structures & processes?								
199	F8-F10	Organisational structures & processes enhanced organisational strategy?								
200	F10-F8	Organisational strategy enhanced organisational structures & processes?								
201	F8-F11	Organisational structures & processes enhanced knowledge sharing?								
202	F11-F8	Knowledge sharing enhanced organisational structures & processes?								
203	F8-F12	Organisational structures & processes enhanced teamwork?								
204	F12-F8	Teamwork enhanced organisational structures & processes?								
205	F8-F13	Organisational structures & processes enhanced open innovation?								
206	F13-F8	Open innovation enhanced organisational structures & processes?								
207	F8-F14	Organisational structures & processes enhanced supplier / service provider network?								
208	F14-F8	Supplier / service provider network enhanced organisational structures & processes?								
209	F8-F15	Organisational structures & processes enhanced partner / alliance network?								
210	F15-F8	Partner / alliance network enhanced organisational structures & processes?								
211	F8-F16	Organisational structures & processes enhanced customer needs identification?								
212	F16-F8	Customer needs identification enhanced organisational structures & processes?								
213	F8-F17	Organisational structures & processes enhanced customer involvement?								
214	F17-F8	Customer involvement enhanced organisational structures & processes?								
215	F8-F18	Organisational structures & processes enhanced market analysis?								
216	F18-F8	Market analysis enhanced organisational structures & processes?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
F9 - Organisational culture										
217	F9-F10	Organisational culture enhanced organisational strategy?								
218	F10-F9	Organisational strategy enhanced organisational culture?								
219	F9-F11	Organisational culture enhanced knowledge sharing?								
220	F11-F9	Knowledge sharing enhanced organisational culture?								
221	F9-F12	Organisational culture enhanced teamwork?								
222	F12-F9	Teamwork enhanced organisational culture?								
223	F9-F13	Organisational culture enhanced open innovation?								
224	F13-F9	Open innovation enhanced organisational culture?								
225	F9-F14	Organisational culture enhanced supplier / service provider network?								
226	F14-F9	Supplier / service provider network enhanced organisational culture?								
227	F9-F15	Organisational culture enhanced partner / alliance network?								
228	F15-F9	Partner / alliance network enhanced organisational culture?								
229	F9-F16	Organisational culture enhanced customer needs identification?								
230	F16-F9	Customer needs identification enhanced organisational culture?								
231	F9-F17	Organisational culture enhanced customer involvement?								
232	F17-F9	Customer involvement enhanced organisational culture?								
233	F9-F18	Organisational culture enhanced market analysis?								
234	F18-F9	Market analysis enhanced organisational culture?								
F10 - Organisational strategy										
235	F10-F11	Organisational strategy enhanced knowledge sharing?								
236	F11-F10	Knowledge sharing enhanced organisational strategy?								
237	F10-F12	Organisational strategy enhanced teamwork?								
238	F12-F10	Teamwork enhanced organisational strategy?								
239	F10-F13	Organisational strategy enhanced open innovation?								
240	F13-F10	Open innovation enhanced organisational strategy?								
241	F10-F14	Organisational strategy enhanced supplier / service provider network?								
242	F14-F10	Supplier / service provider network enhanced organisational strategy?								
243	F10-F15	Organisational strategy enhanced partner / alliance network?								
244	F15-F10	Partner / alliance network enhanced organisational strategy?								
245	F10-F16	Organisational strategy enhanced customer needs identification?								
246	F16-F10	Customer needs identification enhanced organisational strategy?								
247	F10-F17	Organisational strategy enhanced customer involvement?								
248	F17-F10	Customer involvement enhanced organisational strategy?								
249	F10-F18	Organisational strategy enhanced market analysis?								
250	F18-F10	Market analysis enhanced organisational strategy?								
F11 – Knowledge sharing										
251	F11-F12	Knowledge sharing enhanced teamwork?								
252	F12-F11	Teamwork enhanced knowledge sharing?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
253	F11-F13	Knowledge sharing enhanced open innovation?								
254	F13-F11	Open innovation enhanced knowledge sharing?								
255	F11-F14	Knowledge sharing enhanced supplier / service provider network?								
256	F14-F11	Supplier / service provider network enhanced knowledge sharing?								
257	F11-F15	Knowledge sharing enhanced partner / alliance network?								
258	F15-F11	Partner / alliance network enhanced knowledge sharing?								
259	F11-F16	Knowledge sharing enhanced customer needs identification?								
260	F16-F11	Customer needs identification enhanced knowledge sharing?								
261	F11-F17	Knowledge sharing enhanced customer involvement?								
262	F17-F11	Customer involvement enhanced knowledge sharing?								
263	F11-F18	Knowledge sharing enhanced market analysis?								
264	F18-F11	Market analysis enhanced knowledge sharing?								
F12 - Teamwork										
265	F12-F13	Teamwork enhanced open innovation?								
266	F13-F12	Open innovation enhanced teamwork?								
267	F12-F14	Teamwork enhanced supplier / service provider network?								
268	F14-F12	Supplier / service provider network enhanced teamwork?								
269	F12-F15	Teamwork enhanced partner / alliance network?								
270	F15-F12	Partner / alliance network enhanced teamwork?								
271	F12-F16	Teamwork enhanced customer needs identification?								
272	F16-F12	Customer needs identification enhanced teamwork?								
273	F12-F17	Teamwork enhanced customer involvement?								
274	F17-F12	Customer involvement enhanced teamwork?								
275	F12-F18	Teamwork enhanced market analysis?								
276	F18-F12	Market analysis enhanced teamwork?								
F13 - Open innovation										
277	F13-F14	Open innovation enhanced supplier / service provider network?								
278	F14-F13	Supplier / service provider network enhanced open innovation?								
279	F13-F15	Open innovation enhanced partner / alliance network?								
280	F15-F13	Partner / alliance network enhanced open innovation?								
281	F13-F16	Open innovation enhanced customer needs identification?								
282	F16-F13	Customer needs identification enhanced open innovation?								
283	F13-F17	Open innovation enhanced customer involvement?								
284	F17-F13	Customer involvement enhanced open innovation?								
285	F13-F18	Open innovation enhanced market analysis?								
286	F18-F13	Market analysis enhanced open innovation?								
F14 - Supplier / service provider network										
287	F14-F15	Supplier / service provider network enhanced partner / alliance network?								
288	F15-F14	Partner / alliance network enhanced supplier / service provider network?								

No.	Factor no	Paired comparison of factors	Concept Development		Technology Development		Product Development		Implementation	
			Y/N	Comment	Y/N	Comment	Y/N	Comment	Y/N	Comment
289	F14-F16	Supplier / service provider network enhanced customer needs identification?								
290	F16-F14	Customer needs identification enhanced supplier / service provider network?								
291	F14-F17	Supplier / service provider network enhanced customer involvement?								
292	F17-F14	Customer involvement enhanced supplier / service provider network?								
293	F14-F18	Supplier / service provider network enhanced market analysis?								
294	F18-F14	Market analysis enhanced supplier / service provider network?								
F15 - Partner / alliance network										
295	F15-F16	Partner / alliance network enhanced customer needs identification?								
296	F16-F15	Customer needs identification enhanced partner / alliance network?								
297	F15-F17	Partner / alliance network enhanced customer involvement?								
298	F17-F15	Customer involvement enhanced partner / alliance network?								
299	F15-F18	Partner / alliance network enhanced market analysis?								
300	F18-F15	Market analysis enhanced partner / alliance network?								
F16 - Identification of customer needs										
301	F16-F17	Customer needs identification enhanced customer involvement?								
302	F17-F16	Customer involvement enhanced customer needs identification?								
303	F16-F18	Customer needs identification enhanced market analysis?								
304	F18-F16	Market analysis enhanced customer needs identification?								
F17 - Customer involvement										
305	F17-F18	Customer involvement enhanced market analysis?								
306	F18-F17	Market analysis enhanced customer involvement?								

Appendix B – ISM results

Concept development stage

Table 1: Concept Development Stage Reachability Matrix

		Factor j																		DP ¹
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Factor i	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	15
	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
	3	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	3
	4	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	15
	5	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2
	6	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	7	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	8	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	9	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	10	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	16
	11	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	16
	12	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	13	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	15	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	16	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	17	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	15
	18	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	17
Dep ²		14	15	15	14	16	14	14	14	14	1	2	14	14	18	14	14	14	1	

- 1. DP = driving power
- 2. Dep = dependence

Table 2: Concept Development Stage Level Partitioning

Iteration	Factor	Reachability set = Intersection set	Level
1	F14 – supplier/service provider network	14	1
2	F2 – Entrepreneurial behaviour	2	2
	F5 – Motivation	5	
3	F3 – Leadership & championing	3	3
4	F1 – Technical skills & expertise	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	4
	F4 – Communication	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F6 – Creativity	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F7 – Top management support	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F8 – Organisational structures & processes	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F9 – Organisational culture	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F12 – Teamwork	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F13 – Open innovation	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F15 – Partner/alliance network	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
	F16 – Customer needs identification	1, 4, 6, 7, 8, 9, 12, 13, 15, 16, 17	
5	F10 – Organizational strategy	10	5
	F11 – Knowledge sharing	11	
6	F18 – Market analysis	18	6

Technology development stage

Table 3: Technology Development Stage Reachability Matrix

		Factor j																		DP ¹
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Factor i	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0	13
	2	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	13
	3	0	0	1	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1	10
	4	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	13
	5	0	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1	9
	6	0	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1	9
	7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	8	0	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1	9
	9	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	14
	10	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	14
	11	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	15

	Factor <i>j</i>																		DP ¹
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
12	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	16
13	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	0	9
14	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	0	9
15	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	0	9
16	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	0	9
17	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	1	0	9
18	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	17
Dep ²	8	8	9	8	17	17	18	17	4	1	3	2	17	17	17	17	17	1	-

1. DP = driving power
2. Dep = dependence

Table 4: Technology Development Stage Level Partitioning

Iteration	Factor	Reachability set = Intersection set	Level
1	F7 – Top management support	7	1
2	F5 – Motivation	5, 6, 8, 13, 14, 15, 16, 17	2
	F6 – Creativity	5, 6, 8, 13, 14, 15, 16, 17	
	F8 – Organisational structures & processes	5, 6, 8, 13, 14, 15, 16, 17	
	F13 – Open innovation	5, 6, 8, 13, 14, 15, 16, 17	
	F14 – Supplier/service provider network	5, 6, 8, 13, 14, 15, 16, 17	
	F15 – Partner/alliance network	5, 6, 8, 13, 14, 15, 16, 17	
	F16 – Customer needs identification	5, 6, 8, 13, 14, 15, 16, 17	
	F17 – Customer involvement	5, 6, 8, 13, 14, 15, 16, 17	
3	F3 – Leadership & championing	3	
4	F1 – Technical skills & expertise	1, 2, 4	4
	F2 – Entrepreneurial behaviour	1, 2, 4	
	F4 – Communication	1, 2, 4	
5	F9 – Organisational culture	9	5
	F10 – Organizational strategy	10	
6	F11 – Knowledge sharing	11	6
7	F12 – Teamwork	12	7
8	F18 – Market analysis	18	8

Product development stage

Table 5: Product Development Stage Reachability Matrix

	Factor <i>j</i>																		DP ¹
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Factor <i>i</i>	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	2	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	3	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	4	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	5	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	6	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3
	7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	8	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	9	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3
	10	0	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1	10
	11	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	17
	12	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	17
	13	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	14	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	15	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	16	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	17	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
	18	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	15
Dep ²	14	14	14	14	14	17	18	14	17	1	2	2	15	15	15	15	15	15	-

1. DP = driving power
2. Dep = dependence

Table 6: Product Development Stage Level Partitioning

Iteration	Factor	Reachability set = Intersection set	Level
1	F7 – Top management support	7	1
2	F6 – Creativity	6, 9	2
	F9 – Organisational culture	6, 9	
3	F1 – Technical skills & expertise	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	3
	F2 – Entrepreneurial behaviour	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F3 – Leadership & championing	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F4 – Communication	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F5 – Motivation	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F8 – Organisational structures & processes	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F13 – Open innovation	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F14 – Supplier/service provider network	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F15 – Partner/alliance network	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F16 – Customer needs identification	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
4	F17 – Customer involvement	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	4
	F18 – Market analysis	1, 2, 3, 4, 5, 8, 13, 14, 15, 16, 17, 18	
	F10 – Organizational strategy	10	
	F11 – Knowledge sharing	11, 12	
	F12 – Teamwork	11, 12	

Implementation stage

Table 7: Implementation Stage Reachability Matrix

		Factor <i>j</i>																		DP ¹
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Factor <i>i</i>	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	2	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	3	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	4	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	5	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	6	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
	7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	8	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	10	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	11	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	17
	12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	13	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	14	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	15	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	16	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	17	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
	18	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	16
Dep ²	15	15	15	15	15	16	17	15	16	15	2	1	15	15	15	15	15	15	-	

1. DP = driving power

2. Dep = dependence

Table 8: Implementation Stage Level Partitioning

Iteration	Factor	Reachability set = Intersection set	Level
1	F7 – Top management support	7	1
	F9 – Organisational culture	9	
2	F6 – Creativity	6	2
3	F1 – Technical skills & expertise	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	3
	F2 – Entrepreneurial behaviour	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F3 – Leadership & championing	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F4 – Communication	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F5 – Motivation	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F8 – Organisational structures & processes	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F10 – Organizational strategy	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F13 – Open innovation	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F14 – Supplier/service provider network	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
	F15 – Partner/alliance network	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
F16 – Customer needs identification	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18		
F17 – Customer involvement	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18		

Iteration	Factor	Reachability set = Intersection set	Level
	F18 – Market analysis	1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 17, 18	
4	F11 – Knowledge sharing	11	4
5	F12 – Teamwork	12	5