

Table S1. Technology performance matrix.

Benefit	Cost (C1)	Vulnerability to Water (C2)	Flexibility (C3)	Accuracy of Information (C4)	Reading Range (C5)	Data Transfer Speed (C6)	Multiple Tags Readability (C7)	Identification Capacity (C8)	Tag Writing Cycle (C9)
Paper based recording	(0.0, 0.1, 0.2)	(0.8, 0.9, 1.0)	(0.0, 0.1, 0.2)	(0.0, 0.1, 0.2)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
1D Barcode	(0.0, 0.05, 0.1)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.5, 0.75, 0.9)	(0.0, 0.1, 0.2)	(0.1, 0.2, 0.3)	(0.0, 0.0, 0.0)	(0.3, 0.5, 0.7)	(0.0, 0.1, 0.2)
2D barcode	(0.0, 0.05, 0.1)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.5, 0.75, 0.9)	(0.0, 0.1, 0.2)	(0.1, 0.2, 0.3)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.0, 0.1, 0.2)
RFID passive LF read-only	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.1, 0.2, 0.3)	(0.15, 0.25, 0.35)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive LF read-write	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.1, 0.2, 0.3)	(0.15, 0.25, 0.35)	(0.1, 0.2, 0.3)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
RFID passive HF read-only	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.7, 0.8, 0.9)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive HF read-write	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.7, 0.8, 0.9)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
RFID passive HF with sensor	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.7, 0.8, 0.9)	(0.8, 0.9, 1.0)	(0.1, 0.2, 0.3)	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
RFID passive UHF read only	(0.5, 0.7, 0.8)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.7, 0.8, 0.9)	(0.5, 0.75, 0.9)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive UHF read-write	(0.5, 0.7, 0.8)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.7, 0.8, 0.9)	(0.5, 0.75, 0.9)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
RFID passive UHF read write with sensor	(0.5, 0.7, 0.8)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.5, 0.75, 0.9)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
Semi passive RFID	(0.75, 0.85, 0.95)	(0.6, 0.75, 0.85)	(0.1, 0.2, 0.3)	(0.8, 0.9, 1.0)	(0.7, 0.8, 0.9)	(0.7, 0.8, 0.9)	(0.6, 0.75, 0.85)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
Active RFID	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
NFC	(0.1, 0.2, 0.3)	(0.0, 0.1, 0.2)	(0.7, 0.8, 0.9)	(0.8, 0.9, 1.0)	(0.1, 0.2, 0.3)	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)
WSN	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.4, 0.6, 0.75)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)
Smart packaging indicator	(0.7, 0.8, 0.9)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)

Table S1. Cont.

Benefit	Memory Capacity (C10)	Environmental Parameters Recording (C11)	Real Time Location Recording (C12)	Real Time Alert (C13)	Durability of Data Carrier (C14)	World-Wide Standard (C15)	Data Security (C16)	Manual Data Readability (C17)
Paper based recording	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.1, 0.2)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)
1D Barcode	(0.0, 0.1, 0.2)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.1, 0.2)	(0.8, 0.9, 1.0)	(0.1, 0.2, 0.3)	(0.8, 0.9, 1.0)
2D barcode	(0.5, 0.7, 0.8)	(0.0,0.0,0.0)	(0.0,0.0,0.0)	(0.0,0.0,0.0)	(0.0, 0.1, 0.2)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)
RFID passive LF read-only	(0.1, 0.2, 0.3)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)
RFID passive LF read-write	(0.2, 0.3, 0.4)	(0.0,0.0,0.0)	(0.0,0.0,0.0)	(0.0,0.0,0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive HF read-only	(0.1, 0.2, 0.3)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)
RFID passive HF read-write	(0.3, 0.5,0.7)	(0, 0, 0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive HF with sensor	(0.3, 0.5, 0.7)	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive UHF read only	(0.1, 0.2, 0.3)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)
RFID passive UHF read-write	(0.5, 0.7, 0.8)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
RFID passive UHF read write with sensor	(0.5, 0.7, 0.8)	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
Semi passive RFID	(0.7, 0.8, 0.9)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.6, 0.8)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
Active RFID	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.6, 0.8)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
NFC	(0.3, 0.5, 0.7)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
WSN	(0.1, 0.2, 0.3)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.3, 0.6, 0.8)	(0.8, 0.9, 1.0)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)
Smart packaging indicator	(0.7, 0.8, 0.9)	(0.8, 0.9, 1.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)	(0.0, 0.1, 0.2)	(0.0, 0.0, 0.0)	(0.0, 0.0, 0.0)	(0.8, 0.9, 1.0)

Table S2. Combined pairwise criteria comparison matrix for two decision makers for case 2.

Criteria	C4	C6	C5	C8	C9
C4	(1, 1, 1)	(0.816, 1.225, 2)	(0.775, 1, 1.291)	(0.183, 0.224, 0.289)	(0.289, 0.408, 0.707)
C6	(0.500, 0.816, 1.225)	(1, 1, 1)	(0.500, 0.816, 1.225)	(0.169, 0.204, 0.258)	(0.258, 0.354, 0.577)
C5	(0.775, 1, 1.291)	(0.816, 1.225, 2)	(1, 1, 1)	(0.204, 0.267, 0.408)	(0.408, 0.632, 0.866)
C8	(3.464, 4.472, 5.477)	(3.873, 4.899, 5.916)	(2.449, 3.742, 4.899)	(1, 1, 1)	(2, 3, 4)
C9	(1.414, 2.449, 3.464)	(1.732, 2.828, 3.873)	(1.155, 1.581, 2.449)	(0.250, 0.333, 0.500)	(1, 1, 1)
C10	(3.162, 4.243, 5.292)	(4, 5, 6)	(2.236, 3.464, 4.583)	(0.577, 0.707, 1)	(1.732, 2.828, 3.873)
C11	(3.464, 4.472, 5.477)	(4.243, 5.292, 6.325)	(2.646, 4, 5.196)	(1, 1.414, 1.732)	(2.449, 3.464, 4.472)
C15	(0.333, 0.500, 1)	(0.500, 0.816, 1.225)	(0.577, 0.775, 1)	(0.154, 0.183, 0.224)	(0.224, 0.289, 0.408)
C1	(0.183, 0.224, 0.289)	(0.204, 0.258, 0.354)	(0.204, 0.267, 0.408)	(0.111, 0.125, 0.143)	(0.143, 0.167, 0.200)
C16	(0.189, 0.236, 0.316)	(0.200, 0.250, 0.333)	(0.189, 0.236, 0.316)	(0.118, 0.126, 0.136)	(0.144, 0.169, 0.204)
	C10	C11	C15	C1	C16
C4	(0.189, 0.236, 0.316)	(0.183, 0.224, 0.289)	(1, 2, 3)	(3.464, 4.472, 5.477)	(3.162, 4.243, 5.292)
C6	(0.167, 0.200, 0.250)	(0.158, 0.189, 0.236)	(0.816, 1.224, 2)	(2.828, 3.873, 4.899)	(3, 4, 5)
C5	(0.218, 0.289, 0.447)	(0.192, 0.250, 0.378)	(1, 1.291, 1.732)	(2.449, 3.742, 4.899)	(3.162, 4.243, 5.292)
C8	(1, 1.414, 1.732)	(0.577, 0.707, 1)	(4.472, 5.477, 6.481)	(7, 8, 9)	(7.348, 7.937, 8.485)
C9	(0.258, 0.354, 0.577)	(0.224, 0.289, 0.408)	(2.449, 3.464, 4.472)	(5, 6, 7)	(4.899, 5.916, 6.928)
C10	(1, 1, 1)	(0.500, 0.577, 0.707)	(4.243, 5.292, 6.325)	(7.348, 7.937, 8.485)	(7, 8, 9)
C11	(1.414, 1.732, 2)	(1, 1, 1)	(4.472, 5.477, 6.481)	(6.481, 7.483, 8.485)	(6.708, 7.348, 7.937)
C15	(0.158, 0.189, 0.236)	(0.154, 0.183, 0.224)	(1, 1, 1)	(2.449, 3.464, 4.472)	(2, 3.162, 4.243)
C1	(0.118, 0.126, 0.136)	(0.118, 0.134, 0.154)	(0.224, 0.289, 0.408)	(1, 1, 1)	(0.577, 1, 1.732)
C16	(0.111, 0.125, 0.143)	(0.126, 0.136, 0.149)	(0.236, 0.316, 0.500)	(0.577, 1, 1.732)	(1, 1, 1)

Table S3. TOPSIS scores and augmented scores of technologies for case 2.

<div>Score</div> <div>Technologies</div>	TOPSIS score	Augmented score
1D Barcode	0.215036	1
Paper records	0.285938	2
RFID passive LF read-only	0.325128	4
RFID passive HF read-only	0.335634	8
RFID passive UHF read only	0.348900	16
RFID passive LF read-write	0.382646	32
2D barcode	0.419489	64
NFC	0.423791	128
RFID passive HF read-write	0.429226	256
RFID passive UHF read-write	0.469872	512
WSN	0.551499	1024
RFID passive HF with sensor	0.618166	2048
Smart packaging indicator	0.624862	4096
RFID passive UHF read write with sensor	0.676235	8192
Semi passive RFID	0.928689	16384
Active RFID	0.959471	32768

Table S4. The combined pairwise criteria comparison matrix for two decision makers for case 3.

Criteria	C3	C4	C8	C9	C10	C15	C16	C1
C3	(1, 1, 1)	(0.577, 1, 1.732)	(2.449, 3.464, 4.472)	(5, 6, 7)	(3.464, 4.472, 5.477)	(1.414, 2.449, 3.464)	(4.899, 5.916, 6.928)	(0.224, 0.289, 0.408)
C4	(0.577, 1, 1.732)	(1, 1, 1)	(2.449, 3.464, 4.472)	(4.899, 5.916, 6.928)	(3.464, 4.472, 5.477)	(1.414, 2.449, 3.464)	(5, 6, 7)	(0.224, 0.289, 0.408)
C8	(0.224, 0.2887, 0.408)	(0.224, 0.289, 0.408)	(1, 1, 1)	(2.449, 3.464, 4.472)	(1, 2, 3)	(0.333, 0.500, 1)	(2.449, 3.464, 4.472)	(0.143, 0.167, 0.200)
C9	(0.143, 0.167, 0.200)	(0.144, 0.169, 0.204)	(0.224, 0.289, 0.408)	(1, 1, 1)	(0.289, 0.408, 0.707)	(0.183, 0.224, 0.289)	(0.577, 1, 1.732)	(0.111, 0.119, 0.126)
C10	(0.183, 0.224, 0.289)	(0.183, 0.224, 0.2887)	(0.333, 0.500, 1)	(1.414, 2.449, 3.464)	(1, 1, 1)	(0.250, 0.333, 0.500)	(1.414, 2.449, 3.464)	(0.125, 0.143, 0.167)
C15	(0.289, 0.408, 0.707)	(0.289, 0.408, 0.707)	(1, 2, 3)	(3.464, 4.472, 5.477)	(2, 3, 4)	(1, 1, 1)	(3.464, 4.472, 5.477)	(0.167, 0.200, 0.250)
C16	(0.144, 0.169, 0.204)	(0.143, 0.167, 0.200)	(0.224, 0.289, 0.408)	(0.577, 1, 1.732)	(0.289, 0.408, 0.707)	(0.183, 0.224, 0.289)	(1, 1, 1)	(0.111, 0.118, 0.126)
C1	(2.449, 3.464, 4.472)	(2.449, 3.464, 4.472)	(5, 6, 7)	(7.937, 8.485, 9)	(6, 7, 8)	(4, 5, 6)	(7.937, 8.485, 9)	(1, 1, 1)

Table S5. TOPSIS scores and augmented scores of technologies for case 3.

Technology	TOPSIS score	Augmented score
WSN	0.257187	1
Active RFID	0.287976	2
Semi passive RFID	0.309957	4
Smart packaging indicator	0.377133	8
RFID passive UHF read only	0.467505	16
RFID passive UHF Read write	0.477210	32
RFID passive UHF with sensor	0.477210	64
RFID passive LF read only	0.534195	128
RFID passive LF read write	0.540315	256
RFID passive HF read-only	0.569547	512
RFID passive HF read-write	0.578913	1024
RFID passive HF with sensor	0.578913	2048
Paper form	0.627669	4096
NFC	0.837086	8192
1D Barcode	0.861254	16384
2D barcode	0.914570	32768

Table S6. Combined pairwise criteria comparison matrix for two decision makers for case 4.

Criteria	C1	C3	C4	C10	C8
C1	(1, 1, 1)	(3, 4, 5)	(5, 6, 7)	(6, 6.7082, 7.3485)	(4.8990, 5.9161, 6.9282)
C3	(0.2000, 0.2500, 0.3333)	(1, 1, 1)	(2, 3, 4)	(2.2361, 3.4641, 4.5826)	(1.7321, 2.8284, 3.8730)
C4	(0.1429, 0.1667, 0.2000)	(0.2500, 0.3333, 0.5000)	(1, 1, 1)	(1, 1.4142, 2.2361)	(0.5774, 1, 1.7321)
C10	(0.1361, 0.1491, 0.1667)	(0.2182, 0.2887, 0.4472)	(0.4472, 0.7071, 1)	(1, 1, 1)	(0.5774, 0.7746, 1)
C8	(0.1443, 0.1690, 0.2041)	(0.2582, 0.3536, 0.5774)	(0.5774, 1, 1.7321)	(1, 1.2910, 1.7321)	(1, 1, 1)
C11	(0.3333, 0.5000, 1)	(2, 3, 4)	(4, 5, 6)	(4.5826, 5.6569, 6.7082)	(3.8730, 4.8990, 5.9161)
C17	(0.2500, 0.3333, 0.5000)	(1, 2, 3)	(3, 4, 5)	(3.4641, 4.5826, 5.6569)	(2.8284, 3.8730, 4.8990)
C16	(0.1111, 0.1250, 0.1429)	(0.1667, 0.2000, 0.2500)	(0.2500, 0.3333, 0.5000)	(0.4472, 0.7071, 1)	(0.2582, 0.3536, 0.5774)
C15	(0.1179, 0.1260, 0.1361)	(0.1690, 0.2041, 0.2582)	(0.2582, 0.3536, 0.5774)	(0.5774, 0.7746, 1)	(0.2500, 0.3333, 0.5000)
	C11	C17	C16	C15	
C1	(1, 2, 3)	(2, 3, 4)	(7, 8, 9)	(7.3485, 7.9373, 8.4853)	
C3	(0.2500, 0.3333, 0.5000)	(0.3333, 0.5000, 1)	(4, 5, 6)	(3.8730, 4.8990, 5.9161)	
C4	(0.1667, 0.2000, 0.2500)	(0.2000, 0.2500, 0.3333)	(2, 3, 4)	(1.7321, 2.8284, 3.8730)	
C10	(0.1491, 0.1768, 0.2182)	(0.1768, 0.2182, 0.2887)	(1, 1.4142, 2.2361)	(1, 1.2910, 1.732)	
C8	(0.1690, 0.2041, 0.2582)	(0.2041, 0.2582, 0.3536)	(1.7321, 2.8284, 3.8730)	(2, 3, 4)	
C11	(1, 1, 1)	(1, 2, 3)	(6, 7, 8)	(5.9161, 6.9282, 7.9373)	
C17	(0.3333, 0.5000, 1)	(1, 1, 1)	(5, 6, 7)	(4.8990, 5.9161, 6.9282)	
C16	(0.1250, 0.1429, 0.1667)	(0.1429, 0.1667, 0.2000)	(1, 1, 1)	(0.5774, 1, 1.7321)	
C15	(0.1260, 0.1443, 0.1690)	(0.1443, 0.1690, 0.2041)	(0.5774, 1, 1.7321)	(1, 1, 1)	

Table S7. TOPSIS scores and augmented scores of technologies for case 4.

Technology	TOPSIS score	Augmented Score
RFID passive UHF read only	0.240285	1
RFID passive UHF read-write	0.246736	2
RFID passive LF read-only	0.277111	4
RFID passive LF read-write	0.279160	8
RFID passive HF read-only	0.294973	16
RFID passive HF read-write	0.298317	32
RFID passive UHF with sensor	0.376246	64
NFC	0.407724	128
WSN	0.417762	256
RFID passive HF with sensor	0.422389	512
Active RFID	0.424623	1024
Semi passive RFID	0.436032	2048
2D barcode	0.453108	4096
Paper records	0.552589	8192
1D Barcode	0.581226	16384
Smart packaging indicator	0.600892	32768