

	.....	1
	.....	6
	.....	12
	.....	18
	.....	28
	.....	39
	.....	53
	.....	60
	.....	72
	.....	80
	.....	91
	.....	106
	.....	117
	.....	123
A	.....	131
	.....	139
	.....	145
	.....	151
	.....	158
	.....	168
	.....	177
	.....	185
	.....	191
	.....	199
	.....	206
	.....	210
	.....	218
	.....	225
	.....	231
BIM	.....	238
	.....	242
	.....	247
	.....	253
CAD	.....	257
	.....	262
	.....	267
	.....	274
	.....	281
	.....	287
	.....	291
	.....	297
	.....	302

/

1.

2.

7-2

	1	2

1.

1

2

3

2.

1

2

1.

1

2

2.

1

2

1.

1

2

2.

1

2

1.

1

2

2.

1

2

1.

1

2

2.

1

2

1		1	7-2 7-3	2
2		1 2	7-2 7-3 10-1	2
3		1 2	7-2 7-3 10-1	2
4		1 2	7-2 7-3 10-1	1
5		1 2	7-2 7-3 10-1	1
				8

+

1		1 2 3 4
2		1 2 3

3		1 2
4		1 2

1.

= 50% + 50%

2.

	/		/	
		25%		7-2 7-3 10-1
		15 %		7-2 7-3 10-1
		10%		7-2 7-3 10-1
		50%		7-2 7-3 10-1

E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}

A

B

C

7-2 7-3 1 2 50%

- 1.
- 2.

2020.09

	1	2	3

ek

e

7

2		
3		1 2 3 1 2 3
4		1 2
5		
6		

=

20% +

40% +

40%

	/		/	
		20 %	10% 10%	7-2 7-3 10-1
		40%		7-2 7-3 10-1
		40%	1	7-2 7-3 10-1

			2	
			3	
			4	
			5	
				30%

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}}\right) c_{ij} / \sum c_{ij}$$

A

B

C

			7-2	7-3	10-1		1	2	3
40%	40%	20%							

1.

2.

3.

2017

2020.09

2016

- 1.
- 2.
- 3.
- 4.
- 5.

4-2

1.

1

2

3

4

5

2.

1

2

3

4

5

6

7

8

1.

1

2

3

4

2.

1

2

3

4

5

6 () (

)

7

8

1		3 4	4-2		
2		1 5	4-2		
3		1 5	4-2		
4		1 5	4-2		
5		1 5	4-2		
6		2 5	4-2		
7		2 5	4-2		
8		2 4 5	4-2		
9		2 4 5	4-2		

	1	
1	2	
	3	
	1	
2	2	
	3	
	4	
	1	
	2	
3	3	
	1	
	2	
	3	
4		
5	1	1/3
	2	

$$= \quad \times 30\% \quad + \quad \times 70\%$$

	/		/	

3

5

1

2012

2012

:

2014

2014

ABBS <http://www.abbs.com.cn/>
- <http://bbs.co188.com/>
<http://bbs.zhulong.com/forum/index.asp>

2020.09

C E S

/

2	2	2-1	2

1	() 1 2 3 4 5	1 2 3 4	2	/	1
2	() 1 1 2 3 4 5 6 7	1 DS3 2 3	8	/ /	1

	2				
3	() 1 1 2 DJ6 3 4 5 6 2	1 DJ6 2 3 5	8	/ /	1
4	() 1 1 2 3 4 5 2	1 2 3 4	2	/ /	1
5	() 1 1 2 3 4 5 2	1 2 3	1	/ /	1

6	() 1 1 2 3 4 5 GPS 2	1 2 3 GPS	4	/	2
7	() 1 1 2 2		1	/	1
8	() 1 1 2 3 4 5 2	(1) (2)	1	/	2
9	() 1 1 2 3 4 5 6 7 2	1 2 3	1	/	2
10	() 1	1	2	/	2

$$\begin{array}{r}
 1 \\
 2 \\
 3 \\
 4 \\
 2
 \end{array}
 \begin{array}{r}
 / \\
 \\
 \\
 \\
 \\
 2
 \end{array}$$

$$\begin{array}{r}
 (\quad) \\
 1 \\
 1 \\
 2 \\
 3 \\
 11 \quad 4 \\
 2
 \end{array}$$

1			4		
2			4		

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

A

B

C

1-2 1 2

65% 35%

1.

	%
1	65
2	35

2.

						%
	0-100	80-8	70-7	60-6	0-5	
1						50
2						50

3.

4.

						%
	1-5	60-6	70-7	80-8	0 100	
1	(30%) (50%)			(20%)		50
2	1. 2.60 3.70 4.80 5.			60% 70 80 90 90		50

--	--	--

5.

0-100	80-8	70-7	60-6	0-5	%
-------	------	------	------	-----	---

50

9

3.

10

:// .c 163. /c /SEU-1003361016

2020.09



0403005

2.5

40

32

8

2014

/

2	2	1-2	1
3	3	1-2	1
4	4	1-2	1

1			1	/	3.
2	1 2	1 2 3 4	3	/	1. 2.

3	1 2 3	1 2	3	/ /	1. 2.
4	1 2 3	1 2 3	9	/ / /	1. 2. 3. 4.

1

1

2

3

5

4

5

6

6	1 2 3	1 2	2	/	1. 2.
7	1 2 3 4 5 6	1 2 3 4	8	/ /	1. 2. 4.
8			1	/	1.

2.

- 
- 1
 - 2
 - 3
 - 4

	1				
	2	2			2.
					3.

		%				%
1.		2	2	0	24	28
2.		3	3	0	36	42
3.		0	10	0	0	10

4.		0	0	20	0	20
		5	15	20	60	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

A

B

C

1-3

1

2

50%

4-2

4

12-2

3

1.

						%
1.						40

2.						60
----	--	--	--	--	--	----

2

						%
	0-100	80-8	70-7	60-6	0-5	
1.						13
2.						20
3.						67

3

							%
		0-100	80-8	70-7	60-6	0-5	

4.							25
							75

1.

2

2.

1.						2016
2.				2015		
3.						2012
4.	.	.		2009		
5.	.		.	.	.	.
	2008					

2020.09

0403006

2.5

40

40

1.

2.

1-2

20%

	1	2
1-2		

1.

1

2

3

4

5

2.

1

2

3

4

3.

1

2

3

1.

1

2

3

□

3

4

3.

1

2

1.

1

2

3

4

5

6

2.

1

2

3

4

5

6

3.

1

2

1.

1

2

3

4

5

6

2.

1

2

3

4

5

3.

1

2

3

4

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1

2

1.

1

2

3

4

5

2.

1

2

3

4

5

6

3.

1

2

1.

1

2

3

4

5

2.

1

2

3

4

3.

1.

1

2

3

2.

1

2

3.

1.

1

2

3

4

5

2.

1

2

3

3.

1

2

1.

1

2

3

4

2.

1

2

3

3.

1

2

1.

1

2

3

4

5

2.

1

2

3

3.

1

2

1.

1

2

3

4

5

2.

1

2

3

4

3.

1

2

1.

1

2

3

2.

1

2

3

3.

1

2

1.

1

2

3

2.

1

2

3

3.

1.

1

2

3

4

5

6

2.

1

2

3

4

5

6

3.

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1



3.

MOOC

4

1

1

—

}

1

●

4		QQ	Bb
5		N+1	N
		1	1/3
		2	1/3
		3	0.6

$$= 50\%+ 50\%$$

	/		/	
		20%		1-2
		20%	MOOC	1-2
		10%		1-2
		50%	60%	1-2

$$0.6$$

$$= \frac{\times + \times}{100 \times +}$$

$$A =$$

$$B =$$

1.

2.

3.

2014

2014

GB50016 2014

2014

MOOC

:// . c 163. /c /YCIT-1205929808#/

ABBS :// .abb .c .c /
- ://bb .c 188.c /
 ://bb . .c / / .a

2020.09

0403007

3.5

56

48

8

2019

1	1	1-1	1
2	2		

--	--	--	--

1	1 2 3 1 2	2	/	1
2	1 3 4 1 2	5	/ /	1
3	 1 2 3 4 5 1 2	8+4	/ / /	1 2
4	1 2 3 1	5+2	/ / /	1 2

	2			
5	1 2 3 4 5 1 2 3 4	12+2	/ / /	1 2
6	1 2 3 1 2 3	8	/ /	1
7	1 2 3 1 2 3	2	/ /	1
8	1 2 3 1 2 3	6	/ /	1

1.

$$\begin{aligned}
 &= \frac{30\% + 30\% + 40\%}{2} \\
 &= 50\%
 \end{aligned}$$

2.

	%				%
1	10	10	0	30	50
2	5	5	30	10	50
	30		30	40	100

1			2		
2			2		
3			2		
4			2		

--	--	--	--	--	--

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}}\right) C_{ij} / \sum C_{ij}$$

A
B
C

121-1

50%

1.

	%
1	75
2	25

2.

	0-100	80-8	70-7	60-6	0-5	
						70

						30

3.

4.

						%
	0-100	80-8	70-7	60-6	0-5	
						50
						50

1.

1	.	2019
2	.	
3	.	
4	.	

2020.09

2

32

32

2019.1

1.

2.

3.

4.

5.

6.

	1	2	3	4	5	6
3-1						

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1

2

4.

1.

1

2

3

4

2.

1

2

3

4

3.

1

2

4.

/

1.

1

2

3

4

5

2.

1

2

3

4

5

6

3.

1

2

4.

1.

1

2

3

4

5

2.

1

2

3

3.

1

2

4.

2020

1.

1

2

3

4

5

2.

1

2

3

4

3.

1

2

4.

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1

2

4.

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1

2

4.

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1

2

4.

;

1.

1

2

3

4

2.

1

2

3

4

3.

1

2

4.

2020

1.

1

2

2.

1

2

3

3.

1

2

4.

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1

2

4.

1.

1

2

3

4

2.

1

2

3

4

3.

1

2

3

4.

2		2	3-1	4
3		1	3-1	2
4		3 4	3-1	4
5		3 4	3-1	2
6		3 4	3-1	4
7		3 4 5	3-1	2
8		3 4 5	3-1	2
9		3 4 5	3-1	2
10		3 4 5	3-1	4
11		3 4	3-1	2
12		3 4 5	3-1	2
				32

1.

2.

3.

1		1
		2
		3
2		1

		2 3 4
3		1 2 3 1 2 3
4		
5		1 2

= 30%+ 70%

	/		/	
		15%	5-6 15%	3-1
		15%	1 5 1 20 5-10 1 5 100	3-1

			15%	
		70%	70% 30% 20% 10% 30% 40%	3-1

0.6

$$= \frac{\times A + \times B}{100 \times (A + B)}$$

A =

B =

Ec c P c

06020800

2.5

40

40

2018.3

1.

2.

3.

4.

5.

6.

7.

8.

3-2

	1	2	3	4	5	6	7	8
3-2								

a a a

B a 1 2 5 7 9

1		1	3-2	4	
2		2	3-2	4	
3		2	3-2	4	
4		3	3-2	4	

5		4	3-2	2	2
6		5	3-2	4	
7		6	3-2	4	
8		7	3-2	2	2
9		7	3-2	4	
10		8	3-2	4	
				36	4

1			2			
2			2			

1.

2.

3.

1		1
		2
		3
2		1

2

3

3

4

		10%	10	15%	3-2
		60%	20%	20%	3-2
			20%	70%	
			20%	20%	

0.6

=
$$\frac{\times A + \times B + \times C}{100 \times (A + B + C)}$$

A =

B =

C =

		4		4
		4		4
		4		4
		4		4
		2		4
		4		4
		4		4
		2		4
		4		4
		4		4

1	2013
2	2013
3	2003
4	
5	

0403008

1

16

16

1999

1.

2.

3.

4.

2-1

6-2

7-2

	1	2	3	4				
		√						
			√	√				
	√							

1.

1

2

3

4

2.

1

2

3

1.

1

2

2.

1

2

3

1.

1

2

3 21

2.

1

2

3 21

1.

1

2

3

4

2.

1

2

3

4

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

5

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

3

4

5

2.

1

2

3

1.

1

- 2
- 3
- 4
- 2.
- 1
- 2
- 3

- 1.
- 1
- 2
- 3
- 4
- 2.
- 1
- 2
- 3

1		2		1	
2		1		1	
3		1		1	
4		2		1	
5		3		1	
6		4		2	
7		4		1	
8		4		2	
9		4		1	
10		4		1	
11		4		1	

12		4		1	
13		4		1	
14		4		1	
				16	

1.

2.

3.

1		1
		2
		3
2		1
		2
		3
3		1
		2
4		1
		2

5		1 2
6		

1.	25
2.	25
3.	25
4.	25

$$= \quad \times 40\% + \quad \times 60\%$$

	/		/	
		40%	= -5	7-2
		%		
		60%		2-1 6-2 7-2

5.

2006

6.

.

.

2004

2020.09

0403009

3.0

48

48

0

2018

1	1	1-1	1
2	2		

40

--	--	--	--	--

1

1

1

2 5

4

/

1

2

1

2

3

4

5

6

2

1

2

1
2
3

4

1
2
3
4
5

4 1

1.

$$\begin{aligned} &= 40\% + 60\% \\ &= \quad + \quad /2 \end{aligned}$$

2.

	%			%
1	10	10	40	60
2	10	10	20	40
	40		60	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

- A
- B
- C

1 2 1-1

50%

1.

	%
1	67
2	33

2.

	0-100	80-8	70-7	60-6	0-5	
						50
						50

3.

1.

1
2
3

2018;

2020.09

2018.3

- 1.
- 2.
- 3.
- 4.
- 5.

3-2

	1	2	3	4	5

1.

1

2

3

4

2.

1

2

3

3.

1.

1

2

3

4

5

2.

1

2

3

4

5

3.

1.

1

2

3

2.

1

2

3

3.

1.

1

2

3

2.

1

2

3

3.

1.

1

2

3

4

5

1

2

2.

1

2

3

4

3.

1.

1

2

3

2.

1

2

3

3.

1.

1

2

3

4

2.

1

2

3

3.

1.

1

2

3

4

2.

1

2

3

4

3.

1		1 2	3-2	2	
2		1 2	3-2	3	
3		1 2	3-2	2	
4		1 2 3	3-2	2	
5		2 3 4 5	3-2	16	
6		2 3	3-2	2	
7		2 3	3-2	2	
8		2 3 4 5	3-2	3	
				32	

1		1 2 3 4
2		1 2 3 4 5 6
3		1 2 3

		1 2 3
4		
5		1 2
		1/3 1/3

$$= 40\% + 60\%$$

$$/ \qquad \qquad \qquad /$$

$$20\% \qquad \qquad \qquad 6 \qquad \qquad \qquad 3-2$$

$$20\%$$

2	6	2018.8
3		2018.8

2020 8

2

2

		1	1-1	
		1 2	1-1	

		1 2	1-1	
		1 2 3 4	1-1	
		1 2 3 4	1-1	
		1 2 3 4	1-1	
		1 2 3 4	1-1	
		1 2 3 4	1-1	

SPSS

SPSS

SPSS

3

1		1
		2
		3
		4
		5
2		1
		2

		3 4 5 6 7 8
3		1. 1 2 3 2. 1 2 3 ,
4		
5		

		1	1/3
		2	1/3
		3	

= 40%+ 60%

5

	/		/	
		40%	4 20-30	1-1
		60%	60% 20% 50% 20% 10%	1-1

2020 8

1
16

- 1.
- 2.

- 1.

1

2

3

4

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

2.

1

1.

1

2

3

2.

1

1.

1

2

3

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

3

4

2.

1

2

1		1 2	9-2	2
2		1 2	9-2	2
3		1 2	9-2	2
4		1 2	9-2	2
5		1 2	9-2	2
6		1 2	9-2	2
7		1 2	9-2	2
8		1 2	9-2	2
				16

3

3

1

2

3

4

1

2		1 2 3
3		1 2
4		1 2 3

$$\frac{4}{4} = \frac{40\% + 60\%}{4}$$

B =

TBL

2019.12

2020.09

1.

2.

3.

- 4.
- 5.

3-3 7-3

	1	2	3	4	5
3-3					
7-3					

- 1.
- 1
- 2
- 3
- 4

- 2.

,

- 3.

- 4.

- 1.
- 1
- 2
- 3

- 2.

3.

4.

4.

1.

2.

3.

4.

1.

1

2

3

4

5

6

7

2.

3.

4.

1.

1

2

3

2.

3.

4.

1.

1

2

2.

3.

4.

1		1	7-3	
2		1 2 3 4 5	3-3 7-3	
3		1 2 3 4 5	3-3 7-3	
4		1 2 3 4 5	3-3 7-3	
5		1 2 3 4 5	3-3 7-3	
6		1 2 3 4 5	3-3 7-3	
7		1 2 3 4 5	3-3 7-3	
8		1 2 3 4 5	3-3 7-3	
				24

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2

		3
4		
5		11/3 21/3

=40%+60%

	/		/	
		20%	10-1520%	3-3 7-3
		20%	20%	3-3 7-3
		60%		3-3 7-3

2020.09

A

1-

2-

3-

4-

3-2

	1	2	3	4
3-2				

1.

- 1
- 2
- 3
- 4
- 5

3.15

2.

- 1
- 2
- 3
- 4
- 5

1.

- 1
- 2

1

2

2.

1

2

1.

1

2

3

4

1

2

2.

1

2

3

4

1.

1

2

3

4

5

6

1

+

2

2.

1

2

3

4

5

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

2.

1

2

3

4

1.

- 1
- 2
- 3
- 4
- 5
- 6

2.

- 1
- 2

1		1	3-2	2
2		1 2	3-2	6
3		1 2 3 4	3-2	6
4		1 2 3 4	3-2	6
5		1 2 3 4	3-2	4
6		1 2 3 4	3-2	2
7		1 2 3 4	3-2	3
				24

1.

2.

	1	
	2	
1	3	
	1	
2	3	
	4	
3	1	4

$$= 40\% + 60\%$$

	/		/	
		40 %		3-2
		60 %		3-2

1

2.

3

2020 8

0403013

1.5

24

2017

/

1	1	1-2	1

2	2	1-2	1
---	---	-----	---

1	()		2	/	1
2			4	/ /	1
3			4	/ /	1

1

5

5

/ /

6

\

$$N^2$$

$$= \frac{50\% + 50\%}{N}$$

2.

		%			%
1		20	20	35	75
2		5	5	15	25
		25	25	50	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

A

B

C

$$1-2 \qquad 1 \qquad 2$$

$$75\% \quad 25\%$$

1.

	%
1	70
2	30

2.

						%
	0-100	80-8	70-7	60-6	0-5	
1						80
2						20

3.

1

1.

1

2

2.

1

2

1

2

1.

1

.

.

2018

2

.

()

2018

2.

1

[:// .c 163. /c /FJGCXY-1003728009](http://www.163.com/Forum/FJGCXY-1003728009)

2

2020.09

2006.4

- 1.
- 2.
- 3.
- 4.

	1	2	3	4
1-2				

1

2

3

4

5

1

2

1

2

3

4

1

2

1

2

3

2

1

2

3

4

1

2

1

2

3

4

5

1

2

1

2

3

4

5

6

2

1

2

3

1

2

2

1

2

1

1

1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
				24	

$$= 40 \% + 0 \%$$

60%

	/		/	
		40 %		1-2
		60 %		1-2

1

2

1

2000 3

2010 8

2020.1.6

/

1.

2.

3.

4.

5.

3 6 8 9

	1	2	3	4	5

1.

1

2

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

3

4

5

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

3

4

2.

1

2

3

4

1.

1

2

3

4

2.

1

2

3

1.

1

2

2.

1

2

1.

1

2

3

2.

1

2

1		2 4	3-2 6-1 6-2	2
2		2 4 5	3-2 6-1 6-2	4
3		2 5	3-2 6-2	4
4		2 3	3-2	3
5		2 3 5	3-2 6-2	3
6		2 3 5	3-2 6-2	4
7		1 5	3-2 6-1 6-2	3
8		1 5	3-2 6-1 6-2	3
9		1 5	3-2 6-1 6-2	2

10		1	3-2 6-1	2
11		1 5	3-2 6-1 6-2	2
				32

1		1 2 3 4
2		1 2 3
3		1 2
4		1 2 3
5		

1.

=

50% +

50%

2.

		%
1		30-35
2		20-25
3		10-15
4		10-15
5		10-15
		100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

A

B

C

3 2 3 50%

S M c a c a F a

0403022

3.0

48

2 2018

/

2	2	1-2	1

1	()		2	/	1
2			6	/ /	1
3			2	/ /	1

5

4

/ /

8

4

/ /
/

1

9

3

= 30%+ 40%+ 30%

= + + +..... /3

= 50%+ 50%

2.

		%					%
1		7	5	7	26	30	75
2		3	5	3	14	0	25
		30			40	30	100

1			2		
2			2		
3			2		

$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$

A

B

C

1-2

1

2

70% 30%

1.

	%
1	65
2	35

2.

						%
	0-100	80-8	70-7	60-6	0-5	
1						50
2						50

--	--	--	--	--	--	--

3



1.

2



2.

1

2

1

2

3.

10

1.
 - 1 . . 2016
 - 2 . .
- 2019
- 3 . . 2008
- 4 . . 2020
- 2.

:// . c 163. /c /YCIT-1001752084

2020.09

2013

/

1

1

2	2	1-2	1.
3	3	1-2	1.
5 4	4	1-2	1.

1

1

1

/ / / Ǝ - ʌ - ʏ

* ɹ • € Ǝ ! ɔ ʏ ɹ λ *

()

2

P ! 4 4

4	()			/ /	2
5	T			/ / /	4
6	()			/ /	2

7				/ /	2
8				/ /	2
5				/ /	3
10				/ /	3
11				/ / /	3

					4
12				/ /	2

=

20%+

70%+

10%

=

+

+

/5

=

50%+

50%

2.

		%			%
1		4	0	20	24

2		8	0	30	38
3		8	0	20	28
4		0	10	0	10
		20	10	70	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

- A
- B
- C

1.

						%
1						24

2						38
3						28
4						10

2

0-10080-870-760-60-5%

1

3

0-100

%

1

2

1.

(2003)

2

GB50003

2001

2002

3

GB50203 98

4

GB50002 2001

2002

5

GB50011 2001

;

6

(

2020.09

2018.9

2018.7

- 1.
- 2.

	1	2
6-2		

1		1 2 3
2		1 2
3		
4		
5		30% 40% 30%

=

30% +

30%+

40%

	/		/	
		30%		1-2 6-2
		30 %		1-2 6-2
		40%		1-2 6-2

1.

2

2.

10

+

+

,

1		2017.12.
2		2014.11.
3		2012.06.
4	3	2016.08.
5	.	
6		.

2020.09

040.

					5
5					1 4 5
6					4 5
7					1 3
8					1 2 3

		%						%
		30%				40%		
		30%	20%	50%		50%	50%	
1	GB/T50502 GB/T50903	2.25	1.5	3.75		5	5	25

2	2007 GB/T 50640 GB/T 50905	1.12	0.75	1.88		2.5	2.5	10
3		1.12	0.75	1.88		2.5	2.5	15
4	GB/T50502 GB/T50903 JGJ/T 121 1 GB/T 13400.1 2 GB/T 13400.2 3 GB/T 13400.3	2.7	1.8	4.5		6	6	30
5	JGJ/T 188-2009 JGJ 146-2013 JGJ 46-2005 GB 50720-2011	2.16	1.44	3.6		4	4	20
		30			30	40		100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

A

B

C

		3-3	1	25%	2	10%
	11-1		3	15%	4	30%
	5	20%				

1.

:

	%	
1	25	40
2	10	
3	15	
4	30	
5	20	

2						
						%
	1-59	60-69	70-79	80-89	90 100	
1	(30%) (50%) 1. 2.60 3.70 4.80 5. (20%) 60% 70 80 90 90					30
2						
3						
4						
5						

3

189

1.2 1.3

3.1

1

1

2

2

1

PC

:// c1-2.c a .c /c /202203748.

2

3

:// .c .c / c /#

2020.09

0403025

1.

2.

3.

3-1

6-1

6-2

	1	2	3

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

4

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

4

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

2.

1

2

3

4

1.

1

2

3

2.

1

2

3

1.

1

2

2.

1

2

1.

1

2

3

2.

1

2

3

1		1 2 3	3-1 6-1 6-2	2
2		2	3-1 6-1 6-2	4
3		1 2 3	3-1 6-1 6-2	2
4		1	3-1 6-1	2
5		1	3-1 6-1	6
6		1	3-1 6-1	4
7		1	3-1 6-1	4

8		3	6-1 6-2	2
9		1 2 3	3-1 6-1 6-2	2
10		1 2 3	3-1 6-1 6-2	4
				32

1		
2		
3		1 3 2 3 1 2 3
4		1 2
5		
6		

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

A

B

C

		3-1		1	2	3		60%	20%
20%		6-1		1	2			80%	20%
6-2		2	3				50%	50%	

$$= 40\% + 60\%$$

	/		/	
		40%	10% 20% 10%	3-1 6-1 6-2
		60%	60%	3-1 6-1 6-2

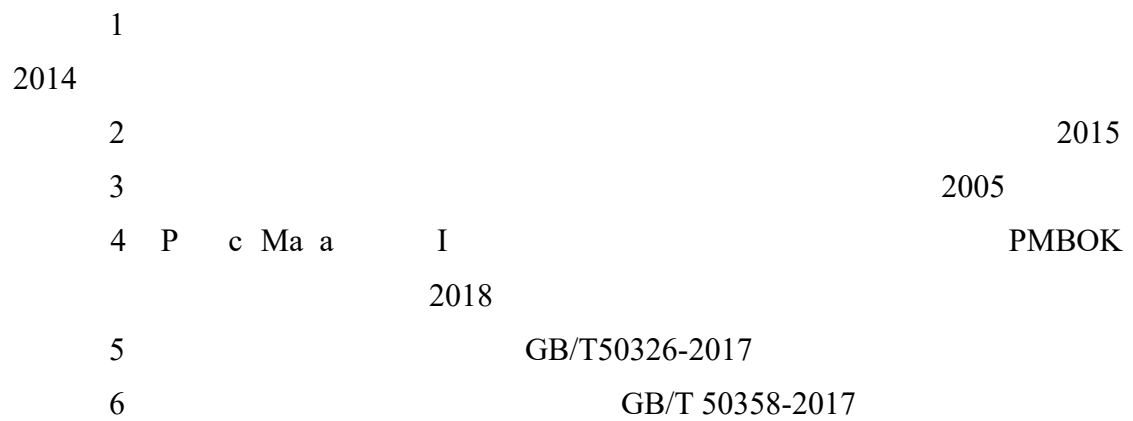
1.

2.

3.

4.

5.



0403026

2

32

/

1			

2		/	
---	--	---	--

	1. 2. 3. 1. 2.		2	/ /	
	1. 2. 3. 4.		6	/ /	
	1.		2	/ /	

2.

3.

4.

1.

2.

3.

4.

5.

16 /

--	--	--	--	--	--

= 30%+

70%

		12	28	40
		18	42	60
		30	70	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

- A
- B
- C

6-1 1

11-1 2 40% 60%

1.

				40
				60

2.

--	--	--	--	--	--	--

1.

3

1

2

2

5

1

2

1.

2.

3.

GB50500 2013
GB50584 2013
2014

4. 2014
 5. 16G101
 6. GB/T50353-2013
 7. 2014
 8. 2014
- 2020.09

--	--	--	--

			12	/ /	
			6	/ /	
			6	/ /	

		50	50	100

		50	50	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}}\right) c_{ij} / \sum c_{ij}$$

- A
- B
- C

5-25 1

1.

					100
1					50
2		20			
3			20		
4			10		

2.

						100

1.

3

1

2

2

5

1

2

3

10

1.

2016

2.

GB50500 2013

3.

GB50584 2013

4.

2014

5.

2014

2020.09

C c La a R a

0403027

1.5

24

24

0

2018

8

1.

2.

3.

3-3

7-3

	1	2	3			
3-3						
7-3						

1.

1

2

2.

1

2

3

4

1.

1

2

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

5

2.

1

2

3

1.

1

2

3

4

2.

1

2

1.

1

2

3

4

5

2.

1

2

3

4

1.

1

2

3

2.

1

2

3

1.

1

2

2.

1

2

1.

1

2

3

4

2.

1

2

1		1	3-3	2	
2		1	3-3	2	
3		2	7-3	2	
4		1 2	7-3	2	
5		1	7-3	2	
6		1	7-3	2	
7		1	3-3	3	
8		1 2	3-3	3	
9		1 2	3-3	3	
10		2	7-3	3	
				24	

1.

2.

3.

1		1 2 3	
2		1 2 3 4 5	
3		1 2 3	3
4		1 2 3	1/3 1/3 60

	%
1.	35
2.	35
3.	30

- 1.
- 2.
- 3.
- 4.

2020.09

P c b a c ac a a

2018.3

1.

2.

3.

4.

3-1

	1	2	3	4
3-1				
6-1				

1.

1

2

3

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

3

4

5

2.

1

2

1.

1

2

3

4

2.

1

2

1.

1

2

3

2.

1

2

1.

1

2

2

- 3
- 4
- 5
- 6
- 7
- 2.
- 1

2

3

- 1.
- 1
- 2
- 3
- 2.
- 1
- 2

1		2 3 4	3-1 6-1	1
2		2 3 4	3-1 6-1	2
3		2 3 4	3-1 6-1	3
4		2 3	3-1 6-1	8
5		4	3-1 6-1	4
6		4	3-1 6-1	12
7		4	3-1 6-1	2
				32

1		1 2 3
2		
3		1 5 2 3
4		
5		
6		

$$= 30 \% + 70\%$$

	/		/	
		30 %	5	3-1 6-1

			30%	
		70 %		3-1 6-1

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

A

B

C

			3-1	1	2	3	4		10%
30%	30%	30%	6-1	2	4			50%	50%

1

1.

2

2

2.

3.

10

1
2
3
4
5

2018.3

2020.09

1
16

M c c

1.

2.

1.

1

2

2.

1

2

1.

1

2

2.

1

2

1.

1

2

2.

1

2

2

1		1 2	5-1	5
2		1 2	5-1	5
3		1 2	5-1	6
				16

3

3

$$= 50\% + 50\% \times 1000$$

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

A

B

C

$$5-1 \qquad 1 \quad 2 \qquad 50\% \quad 50\%$$

TBL

2020.09

6

1
3

2

4

7

2

=

40%+

60%

=

25%+

50%+

25%

2.

		%				%
1		5	10	10	25	50
2		5	0	0	20	25
3		0	10	0	15	25
		10	20	10	60	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

A

B

C

50% 25% 1-2 1 2
6-2 3 25%

1.

	%
1	42
2	33
3	25

2.

						%
	0-100	80-8	70-7	60-6	0-5	
1						20
3						

3.

						%
	0-100	80-8	70-7	60-6	0-5	

1						10
---	--	--	--	--	--	----

4.

						%
	0-100	80-8	70-7	60-6	0-5	
1						10
2						

1.

2

BIM

2018.9

BIM

BIM

1R BIM	5-2	5

1.

1
2 = 50% + BIM 50%

2.

		%		%
	R	25	25	50
	BIM4D	25	25	50
		50	50	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

- A
- B
- C

5-2 1 2

50%

BIM BIM

						%
	0-100	80-8	70-7	60-6	0-5	
BIM						50
BIM						50

BIM

BIM BIM

BIM

BIM

BIM

BIM

BIM

BIM

R

1

2

1 BIM

1 A R

2 BIM

2 BIM

A

Na

2020.09

2017.12

- 1.
2. 4M1E
- 3.
- 4.

	1	2	3	4
6-1				
9-2				

1.

1

2

3

2.

1

2

3

1.

1

2

3

2.

1

2

3

1.

1

2

3

4

2.

1

2

3

1.

1

2

3

4

2.

1

2

3

4

1		1	4-2 4-4	2
2		2 3 4	4-2 4-4 6-2	4
3		2 3	4-2 4-4 6-2 9-2	10
4		4	4-2 4-4 6-2 9-2	8
				24

1		1 2 3
2		
3		1 3 2 3
4		
5		
6		

=

40 % +

60 %

	/		/	
		40 %	5 40%	4-4 6-2 9-2
		60 %		4-4 6-2 9-2

1 .
2 .
3 .
4 .
5 .

2020.1.6

- 1.
- 2.
- 3.
- 4.
- 5.

3

	1	2	3	4	5

- 1.



4.

1

2 "•

8.

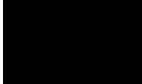
2.

1

2

1		1	3-2	2	
2		2	3-2	4	
3		3 4 5	3-2	10	
4		3 4 5	3-2	6	
5		5	3-2	2	
				24	

1		
2		
3		1 3 2 3 1



		2 3
4		1 2
5		
6		

= 40% + 60%

	/		/	
		40%	10% 20% 10%	3-2
		60%	60%	3-2

3. 2014
4. 2014

2020.09

S P a c e

/

1	1	8-2	8.
2	2	8-2	8.

2 10

	3	
2	1 2	50
		100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}}\right) C_{ij} / \sum C_{ij}$$

- A
- B
- C

8-2

1

2

50%

						%
	0-100	80-8	70-7	60-6	0-5	
1						50
2						50

	CAD	CAD	CAD	CAD		
--	-----	-----	-----	-----	--	--

1.

10

1.

2013

2.

1995

2020.09

CAD

CAD ac ca T a

1
1



CAD

A CAD

A CAD

A CAD

,

,

,

- 1.
- 2.
- 3.
- 4.
- 5.

1-3 2-1 6-3

8-3

	1	2	3	4	5

1.

1 A CAD A CAD

2 A CAD

3 A CAD

2.

 A CAD
A CAD

1.

1

2

3

2.

 A CAD

1.

CAD

2.

1.

2.

3.

1		1 2 3
2		1 2 3 4
3		1 2 3 1 2

		3
4		
5		11/3 21/3

=30%+70%

				(%)

3

CAD

2

CAD

1. CAD
2. A CAD
3. A CAD2014

ABBS :// .abb .c .c /
- ://bb .c 188.c /
://bb . .c / / .a

2020.09



0403045

1

1

1.

2.

2-2

20%

	1	2
2-2		

1. 1

2. 2

3. 3

4. 4

2

5. 5

6. 6

1.

2.

3.

4.

1.

2.

1:100

3.

1:100

4.

1:100

5.

1:50

6.

1:20

7.

8.

2#

594 420

1 5

3.

		80%		2-2

0.6

$$= \frac{\begin{matrix} \times & + & \times \\ 100 \times & + & \end{matrix}}{\quad}$$

A =

B =

1.

2.

3.

GB/T50001-2017

2014 9
2014 2
2014
2010

GB50016 2014
2

.

ABBS [://.abb.c.c/](http://.abb.c.c/)
- ://bb.c 188.c /
://bb . .c / / .a

2020.09

2013

/

1	1	2-2	2
2	2	4-1	4.

	3	8-2	8.

1			1	/	1
			7		2 3
			2		2

		%		%
1		20	20	40
2		20	20	40
3		10	10	20
		50	50	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) C_{ij} / \sum C_{ij}$$

- A
- B
- C

2

8-2

3

1

100

1

70

2

10

3

10

4

10

2

						%
	0-100	80-8	70-7	60-6	0-5	
1						40
2						40

3						20
----------	--	--	--	--	--	-----------

1.

2

1

2

2.

10

1

2

1 GB50003
2001 2002
2 GB50203 98
3 GB50002 2001
4 2002 GB50011 2001
5 ;
2003) (

2020.09

- 1.
- 2.
- 3.
- 4.

4-1

	1	2	3	4

1. 1

2. 2

3. 3

4. 4

5. 5

1.

2.

2		1	2-2	0.5	
3		2 3 4	2-2 4-1 8-2	0.5	
4		2 3 4	2-2 4-1 8-2	0.5	
5		2 3 4	2-2 4-1 8-2	1	
6		2 3 4	2-2 4-1 8-2	1	
				5	

	1.	
	2.	
	3.	
	4.	
	1.	
	2.	
	3.	
	4.	
	1.	
	2.	
	3.	

$$= 70\% + 30\%$$

	/		/	
		50%		2-2 4-1 8-2
		20%		2-2 4-1 8-2
		30%		2-2 4-1 8-2

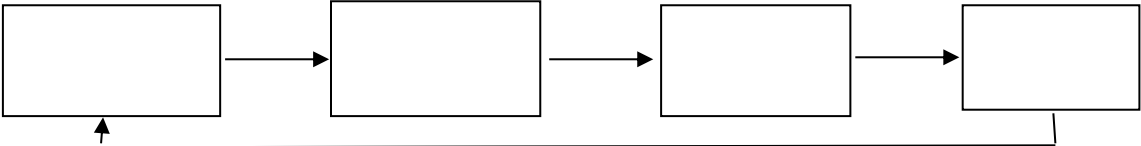
$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}} \right) c_{ij} / \sum c_{ij}$$

A

B

C

2-2 1 3 50% 50%



1.

2006

2.

2000

3.

2002

0403048

1.0

30

2018 8

/

1	1	3-2	3

2	2	11-2	11
	3		

1		2007 GB/T 50640 GB/T 50905	10	/	1
2		1 2 GB/T 13400.2	10	/	2
3		JGJ/T 188-2009 JGJ 146-2013 JGJ 46-2005 GB 50720-2011	10	/	3

--	--	--	--	--	--

1.
2.

40%

60%

 +
3.

		%		%
1	1. 2. ()	20	18	38
2		10	18	28
3		10	24	34
		40	60	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}}\right) c_{ij} / \sum c_{ij}$$

- A
- B
- C

1

45% 55%

100

2 30%

3 40%

2

294

--	--	--	--	--	--	--

3

2

1

PC

: c1 .c /c /7 217791.

2

3

:// .c .c / c /#

4

Bb

5

:// . . .c /

1			
2			

--	--	--	--

			15	/ /	
			5	/ /	
			10	/ /	

		25	25	50
		25	25	50
		50	50	100

$$E_i = \sum \left(\frac{B_{ij}}{A_{ij}}\right) c_{ij} / \sum c_{ij}$$

A
B
C

6-2 11-2 1 2

50% 50%

1.

1

2

3

4

20

20

10

100

50

2.



						50
						50

1.

3

1

2

2

5

1

2

1.

2016

2.

GB50500 2013

3.

GB50584 2013

4.

2014

5.

2014

2020.09

P c Ma a S a Sa Tab

0403050

1

1

PMST

1.

2.

3.

4-2

8-2

9-1

1

1

	1	2	3
4-2			
8-2			
9-1			

PMST

1.

1

2

2.

1

2

3.

1

2

3

4.

1

2

3

4

5.

1

2

3

2

1		1 2	4-2
2		1 2	4-2
3		1 2	4-2
4		1 2	4-2
5		3	8-2 9-1

5

1

2

1

2

3

4

3

1		1. 2. 3. 4. 1
2		1 1
3		2
4		2
5		1. 2. 3.

1

		1/2
	600	600

2

,

3

600

1.

2.

1.

PMST

2.

1

PMST

2

3

2020.09

1

CAD/CAM

BIM

2

3

1

2

3

4

1

2

3

1.

1-1

1-2

1-3

CAD/CAM BIM

1-4

2.

2-1

CAD/CAM

BIM

2-2

2-3

- 1
- 2
- 3
- 4

3.

3-1

3-2

3-3

3-4

3-5

2-2 4-2 9-1 10-1

	1				2			3				
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	3-1	3-2	3-3	3-4	3-5
2-2												
4-2												
9-1												
10-1												

1.

2

3

2.

1

2

3

4

3.

1

2

3

4

1

2

3

4

5

6

5.

1

2 BIM :

3 BIM : BIM

BIM

4

BIM

6

1.

1

2

3

4

2.

10

1

3.

4.

1.

1.
2.
3.
4.
5.

10.

1.

1

16

2

2

3

2.

3.

4.

1

1

2

3

2

3

5.

1

1

2

2

1

2

3

1

5-7

2

3-5

1

2

10

10

10-15

1.

30%

20%

50%

30%

20%

2.

50%

1

90

15-20%

2

80-89

3

70-79

4 60-69

5 59

2020.09