

PATTERN – exercise

A company that deals with the basic computer courses and English language courses wants to expand its business. That expansion (in teaching and book sales) could be achieved through introduction of specialized courses, introduction of certified courses, and books translation in order to improve sales. For introduction of specialized courses, company needs more classrooms, a significant marketing investment, and hiring new teachers. For introduction of certified courses, company will need to hire certified experts for each area. Book translations, which are to increase sales, demand organizing the printing and organizing transportation.

Criteria at level II are: costs of hiring, quality and intensity of competition.

Criteria at level III are: costs of hiring, quality and the possibility of new competitive programs emerging.

Three experts were assigned to weigh the individual criteria at level II and III.

Criteria weights at level II:

(0.30, 0.50, 0.20, 0.40, 0.40, 0.20, 0.20, 0.50, 0.30);

Criteria weights at level III:

(0.20, 0.50, 0.30, 0.45, 0.45, 0.10, 0.50, 0.40, 0.10).

Contribution marks of goals to criteria for the **first expert at second level:** 0.50, 0.30, 0.30, 0.30, 0.60, 0.50, 0.20, 0.10, 0.20.

Contribution marks of goals to criteria for the **second expert at second level:** 0.50, 0.34, 0.25, 0.50, 0.33, 0.25, 0, 0.33, 0.50.

Contribution marks of goals to criteria for the **third expert at second level:** 0.50, 0.20, 0.40, 0.40, 0.20, 0.40, 0.10, 0.60, 0.20.

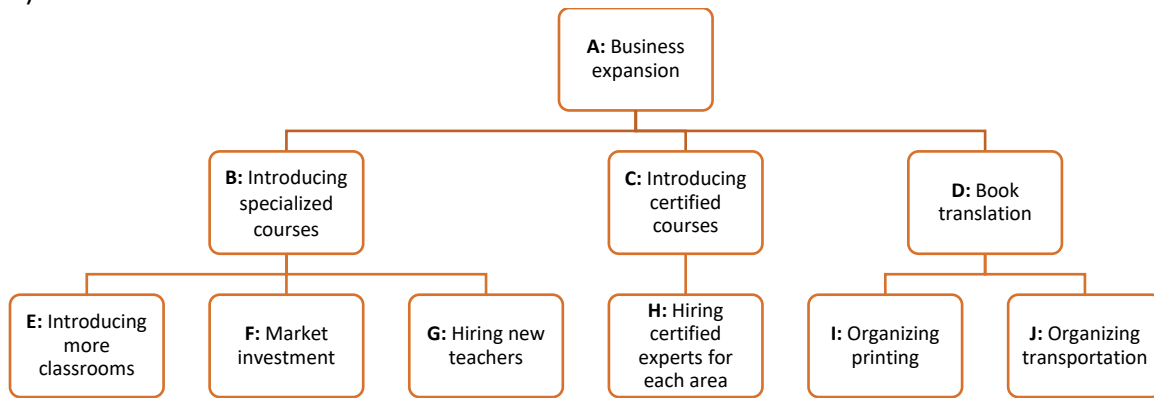
Contribution marks of goals to criteria for the **first expert at third level:** 0.15, 0.05, 0.05, 0.25, 0.30, 0.20, 0.30, 0.15, 0.30, 0.15, 0.15, 0.20, 0.10, 0.25, 0.15, 0.05, 0.10, 0.10.

Contribution marks of goals to criteria for the **second expert at third level:** 0, 0.20, 0.10, 0.20, 0.20, 0.50, 0.30, 0.30, 0.20, 0.30, 0.30, 0.20, 0.10, 0, 0, 0.10, 0, 0.

Contribution marks of goals to criteria for the **third expert at third level:** 0, 0.10, 0, 0, 0, 0, 0.50, 0.40, 0.50, 0.50, 0.40, 0.50, 0, 0.10, 0, 0, 0, 0.

- a) Form the relevance tree;
- b) Calculate the priority of goals based on the local and direct relevance numbers.
- c) Calculate the relevance of goal I to criterion α_1 and to main goal.

a) Relevance tree



b) **LEVEL II:**

Primary matrix for the **first expert**

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|--|-------------------|---------|----------------------|
| | Weights | 0.30 | 0.50 | 0.20 |
| | Goals | Values | | |
| B | Introducing specialized courses | 0.50 | 0.30 | 0.30 |
| C | Introducing certified courses | 0.30 | 0.60 | 0.50 |
| D | Book translation in other languages for higher sales | 0.20 | 0.10 | 0.20 |
| | | 1 | 1 | 1 |

Primary matrix for the **second expert**

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|--|-------------------|---------|----------------------|
| | Weights | 0.40 | 0.40 | 0.20 |
| | Goals | Values | | |
| B | Introducing specialized courses | 0.50 | 0.34 | 0.25 |
| C | Introducing certified courses | 0.50 | 0.33 | 0.25 |
| D | Book translation in other languages for higher sales | 0.00 | 0.33 | 0.50 |
| | | 1 | 1 | 1 |

Primary matrix for the **third expert**

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|--|-------------------|---------|----------------------|
| | Weights | 0.20 | 0.50 | 0.30 |
| | Goals | Values | | |
| B | Introducing specialized courses | 0.50 | 0.20 | 0.40 |
| C | Introducing certified courses | 0.40 | 0.20 | 0.40 |
| D | Book translation in other languages for higher sales | 0.10 | 0.60 | 0.20 |

Final primary matrix for level II

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|--|-------------------|---------|----------------------|
| | Weights | 0.30 | 0.47 | 0.23 |
| | Goals | Values | | |
| B | Introducing specialized courses | 0.50 | 0.28 | 0.32 |
| C | Introducing certified courses | 0.40 | 0.38 | 0.38 |
| D | Book translation in other languages for higher sales | 0.10 | 0.34 | 0.30 |
| | | 1 | 1 | 1 |

Local relevance numbers II level

$$r_2^B = 0.35$$

$$r_2^C = 0.39$$

$$r_2^D = 0.26$$

Priority of the goals at level II: **C>B>D**

LEVEL III:

Primary matrix for the **first expert**

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|---------------------------------|-------------------|---------|----------------------|
| | Weights | 0.20 | 0.50 | 0.30 |
| | Goals | Values | | |
| E | More classrooms | 0.15 | 0.05 | 0.05 |
| F | Marketing investments | 0.25 | 0.30 | 0.20 |
| G | Engagement of new instructors | 0.30 | 0.15 | 0.30 |
| H | Certified experts in each field | 0.15 | 0.15 | 0.20 |
| I | Engagement of printing house | 0.10 | 0.25 | 0.15 |
| J | Organizing transport | 0.05 | 0.10 | 0.10 |
| | | 1 | 1 | 1 |

Primary matrix for the **second expert**

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|---------------------------------|-------------------|---------|----------------------|
| | Weights | 0.45 | 0.45 | 0.10 |
| | Goals | Values | | |
| E | More classrooms | 0.00 | 0.20 | 0.10 |
| F | Marketing investments | 0.20 | 0.20 | 0.50 |
| G | Engagement of new instructors | 0.30 | 0.30 | 0.20 |
| H | Certified experts in each field | 0.30 | 0.30 | 0.20 |
| I | Engagement of printing house | 0.10 | 0.00 | 0.00 |
| J | Organising transport | 0.10 | 0.00 | 0.00 |
| | | 1 | 1 | 1 |

Primary matrix for the **third expert**

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|---------------------------------|-------------------|---------|----------------------|
| | Weights | 0.50 | 0.40 | 0.10 |
| | Goals | Values | | |
| E | More classrooms | 0.00 | 0.10 | 0.00 |
| F | Marketing investments | 0.00 | 0.00 | 0.00 |
| G | Engagement of new instructors | 0.50 | 0.40 | 0.50 |
| H | Certified experts in each field | 0.50 | 0.40 | 0.50 |
| I | Engagement of printing house | 0.00 | 0.10 | 0.00 |
| J | Organizing transport | 0.00 | 0.00 | 0.00 |
| | | 1.00 | 1.00 | 1.00 |

Final primary matrix for level III

| | Criteria | Engaging expenses | Quality | Level of competition |
|----------|---------------------------------|-------------------|---------|----------------------|
| | Weights | 0.38 | 0.45 | 0.17 |
| | Goals | Values | | |
| E | More classrooms | 0.05 | 0.12 | 0.05 |
| F | Marketing investments | 0.15 | 0.17 | 0.23 |
| G | Engagement of new instructors | 0.37 | 0.28 | 0.33 |
| H | Certified experts in each field | 0.32 | 0.28 | 0.30 |
| I | Engagement of printing house | 0.07 | 0.12 | 0.05 |
| J | Organising transport | 0.05 | 0.03 | 0.03 |
| | | 1.00 | 1.00 | 1.00 |

Local relevance numbers III level

$$r_3^E = 0.08$$

$$r_3^F = 0.17$$

$$r_3^G = 0.32$$

$$r_3^H = 0.30$$

$$r_3^I = 0.09$$

$$r_3^J = 0.04$$

Priority of the goals at level III: **G>H>F>I>E>J**

Direct relevance numbers

| | III Level | r_3 | | II Level | r_2 | R |
|----------|---------------------------------|-------|----------|--|-------|------|
| E | More classrooms | 0.08 | B | Introducing specialized courses | 0.35 | 0.03 |
| F | Marketing investments | 0.17 | B | Introducing specialized courses | 0.35 | 0.06 |
| G | Engagement of new instructors | 0.32 | B | Introducing specialized courses | 0.35 | 0.11 |
| H | Certified experts in each field | 0.30 | C | Introducing certified courses | 0.39 | 0.12 |
| I | Engagement of printing house | 0.09 | D | Book translation in other languages for higher sales | 0.26 | 0.02 |
| J | Organizing transport | 0.04 | D | Book translation in other languages for higher sales | 0.26 | 0.01 |

Priority of the goals according to the main goal

H > G > F > E > I > J

c)

Partial relevance number of goal I to the criteria α : **PRN_I ^{α} = 0,026**

Relevance of the goal I for the main goal: **R_I = 0,02**