

## **STRATEGIC DECISION MAKING: APPLYING AHP BASED APP DECISION MENTOR**

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### **Highlights**

- An exploration of three strategic analysis approaches, Six Thinking Hats (STHs), SWOT and PEST analysis using AHP based mobile app Decision Mentor
- Case is taken from tourism sector for prioritizing projects under consideration among Adventure, Meeting (MISE) or Pleasure tourism
- The work demonstrates that the smartphone operated AHP based application Decision Mentor can handle multiple strategic decision analysis approaches.

### **ABSTRACT**

The work is an exploration of three well known strategic analysis approaches, namely Six Thinking Hats (STHs), SWOT (Strength, Weakness, Opportunity and Threat) and PEST (Political, Economic, Social and Technical) analysis using multiple criteria decision analysis (MCDA) tool based on the widely used MCDA theory, the Analytic Hierarchy Process (AHP). The AHP based MCDA tool used in the exploration is Decision Mentor mobile application. The objective of the work is to demonstrate that the AHP based mobile app operating in smartphone can handle multiple strategic analysis methods like STHs, SWOT and PEST. The work has demonstrated how Decision Mentor app can be used as Digital Swiss Army Knife: AHP based analysis of strategic decision problem with multiple approaches. Artificial Intelligence (AI) integration with Decision Mentor further sharpens the process of strategic analysis. The sample case taken for demonstration is from tourism sector, strategic analysis for prioritizing three tourism projects under consideration for entrepreneur exploring appropriate project options among Adventure, Events (MISE: Meeting, Incentive, Conference and Event) or Pleasure tourism.

The work demonstrates that the smartphone operated AHP based application Decision Mentor can handle the strategic decision analysis in a MCDA environment. The work also demonstrates that STHs, SWOT and PEST are special case of MCDA with AHP. AHP implementation steps at Decision Mentor app is presented. The work demonstrates the Decision Mentor generated screenshots of analysis with the ranking of tourism project options.

**Keywords:** AHP, MCDA, Strategic Decision Making, Six Thinking Hats, SWOT, PEST

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## **1. Introduction**

Strategic analysis for decision making in business is key to success. Specially startups, with limited resources needing effective, quick and easy learning tools with low cost giving high value.

The Hats in STHs are the way to see things from different perspectives. The perspectives for Six Thinking Hats (STHs) is considered as decision making technique at the same time AHP is basically the multiple criteria decision analysis technique. Often, prior to framing decision hierarchy in AHP, it is also recommended to use STHs for getting Criteria for AHP as brainstorming session.

SWOT and PEST are well known strategic analysis tools, both are being used with AHP for varied business situations. SWOT sees the scenario of business for founders from internal as well as external perspectives. PEST is the tool to look from wider externalities with respect to the business aspects under consideration.

The work is quick application of Decision Mentor mobile app for prioritizing three tourism business options, namely Adventure, MICE and Pleasure. The objective is to demonstrate the single AHP based MCDA tool to explore strategic situation of the business before moving ahead with the one among the three identified options. The result of the exploration reveals that the Decision Mentor app can handle the strategic multiple criteria decision analysis for all three approaches, namely STHs, SWOT and PEST. The work displays Decision Mentor screen shots of application with AHP implementation process in Decision Mentor app. Further, interesting to see that all three strategic decision analysis resulted Adventure Tourism at the top in ranking. MICE and Pleasure tourism remained almost indifferent. This is rapid test of Decision Mentor for its applicability with other strategic analysis tool comes out to be positive and very encouraging.

## **2. Analytic Hierarchy Process (AHP) and Decision Mentor**

Decision problem consisting of multiple criteria with conflicting objectives among the criterion are called Multiple Criteria Decision Making (MCDM) problem. As an example, deciding to procure an equipment of reliable quality, faster in time, with less price. The procurement situation needs to consider criteria, options and tradeoff between criteria to arrive at most appropriate options, given the needed quality, delivery time and appropriate cost. Analysis of this situations are called Multiple Criteria Decision Making or Analysis (MCDM or MCDA). MCDM / MCDA is a branch of Operations Research (OR) in Mathematics, is well known as Management Science in business world. Analytic Hierarchy Process (AHP) is one of widely used (Vaidya & Kumar, 2006) theory for MCDM/MCDA. AHP is the theory which combines mathematics and psychology, and application of AHP is growing very fast since last 40 years (Madzík & Falát, 2022). AHP is considered as strong strategic decision making tool (Bhushan & Rai, 2004).

Decision Mentor mobile application developed for individual use based on the theory of AHP, invented by Thomas Saaty in early eighties (Saaty, 1980). Decision Mentor is being well recognized and applied (Zindros & Anagnostopoulou, 2024), (Mu, 2023), (Mu, 2022), (Ramos, 2021), (Sergii et al., 2020), (Poudel & Bhattarai 2020). AHP implementation at the Decision Mentor mobile application is presented at Box 1.

<b>Box 1: AHP Implementation at Decision Mentor</b>
<p><b>1.0 Populating Decision Problem in the App</b>                      Create new decision by tapping + sign at bottom center of the app, then write decision problem at given space &lt;New Decision&gt;  <b>Step 1: Add Criteria;</b> Tap at the &lt;Add Criteria&gt;, looking at the criteria, it indicates “complete” with three criteria, one needs look, and edit as needed, add or delete or edit the App recommended criteria tapping &lt;Edit Criteria&gt; button; finalize criteria, once done, tapping to &lt;Done Adding Criteria&gt;, one can add up to five criteria on free version.  <b>Step 2: Add Choices;</b> Tap at the &lt;Add Choices&gt;, conduct similar as of Step 1 for Choices  <b>Note:</b> Adding criteria and choices are powered by AI (brainstorming)</p>
<p><b>2.0 Pairwise Comparison for Criteria and Choices</b>                      Decision Makers input is making judgement with Criteria and Choices  <b>Step 3: Prioritize</b>  <b>Rank Criteria:</b> Conduct pairwise comparison to Criteria  <b>Rank Choices:</b> Conduct pairwise comparison / rating of Choices looking at each Criteria till comparing for all Criteria tapping to &lt;Next&gt;  <b>Consistency</b> checking can be done by clearing &lt;Ignore Inconsistency&gt; button seen at top right corner.</p>
<p><b>3.0 Results of Decision Analysis</b>                      When the three steps are completed, the &lt;Show Results&gt; button becomes active                      1.1 When &lt;Show Results&gt; is tapped, one can see, ranking of Choices with its percentage of weight in a Donut                      1.2 One can see choices ranking with each criterion by tapping &lt;How the choices are ranked&gt;                      1.3 One can see the criteria weight generated by tapping &lt;How the criteria was ranked&gt;, presented in graphical form of spider diagram                      1.4 <b>Sensitivity Analysis</b> can be conducted by switching to &lt;Criteria Ranked&gt; by tapping it as seen on top right, and then need to tap &lt;Try adjusting priority your way&gt; at the bottom; then one can see changes in choice ranking with the changes made to criteria weights.</p>
<p><b>4.0 Additional Features</b>                      1.5 The decision analyzed can be published, to share at the Decision Mentor app home section, which appears to all registered app users.                      1.6 One can also share the decision analysis made to specific person via web link by available means at the internet (email, messenger, Viber WhatsApp etc).                      1.7 The advantage of shared decision analysis is opportunity to other registered users, if one finds useful to him/her, can duplicate the decision analysis, adjust priority with own pairwise comparison and see result, get the informed decision insights.</p>

**Source:** Decision Mentor Creators

### 3. Overview of Strategic Analysis Tools used with AHP

Six Thinking Hats (STHs) is the tool for the concept of lateral thinking, the concept and tool is developed by Edward De Bono in 1985 with the publication of his book six thinking hats. STHs is a parallel thinking process to support decision making (De Bono, 1999). STHs is linked with AHP in following Table 1.

**Table 1:** Connecting Six Thinking Hats with AHP Framework

Hats Color State of Mind	Thinking / Mind / Perspective	Criteria / Factor MCDA with AHP	Remarks
Blue Hat	<b>Thinking on Thinking</b> Thinking Focus	Decision Objective to focus all criteria directed by STHs	Decision objective, to focus on every pairwise comparisons on AHP
White Hat	<b>Information</b> Data   Facts	Data, Information & Knowledge	All criteria / sub-criteria having data or information
Red Hat	<b>Emotion</b> Intuition   Guts Feelings	Intuition	All emotion related criteria
Black Hat	<b>Judgement</b> Risk   Caution   Barrier	Risks	Risks to be considered in the decision problem considered
Yellow Hat	<b>Positivity</b> Opportunity	Opportunity	Reward, Opportunity or Positive aspects of the decision problem under consideration
Green Hat	<b>Creativity</b> Innovation	Innovation	Creativity, Innovation or Value addition aspects of the decision problem under consideration

**Source:** for Six Thinking Hats, De Bono, 1999; AHP interpretations by the authors of the paper

SWOT analysis is planning and informed decision making tool evaluating Strengths, Weaknesses, Opportunities and Threats relating to project or organization. Out of the four criteria used in the SWOT analysis, first two are internal capabilities and last two are relating to external conditions. SWOT is one of the oldest and most widely adopted strategy tools worldwide (Puyt, Lie & Wilderom, 2023). Table 4 presents the SWOT situation for the business case taken for the strategic analysis with other two tools. Lately SWOT is considered as SWOC (Strength, Weakness, Opportunity, Challenges), taking Threat more positively as Challenges. We may consider later SWOT/SWOC for this tool later in the article.

PEST (Political, Economic, Social, Technological) is another well regarded strategic analysis tool, which considers externalities of a strategic decision problem relating to business, industry, development and much more. The PEST is lately extended to PESTEL (Political, Economic, Social, Technological, Environmental, and Legal), however, we will be demonstrating PEST case using Decision Mentor. PEST/PESTEL analysis is also use to identify the Weakness and Threats in SWOT analysis, although Weakness in internal matters. PEST is invented by Aguilar (1967) via his book “Scanning the Business Environment”.

#### 4. Case Example for the Strategic Analysis

The case example is taken is from tourism sector of business. The analysis problem is stated as: Prioritizing the Tourism project under consideration from a group of promoters among Adventure, Events (MICE) and Pleasure tourism. Description of the choices or alternatives being considered are further described. Before describing the tourism business options, let us see the definition of tourism.

*“Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which involve tourism expenditure.”*  
 ~ UNWTO.org

Adventure, Events or MICE (Meetings, Incentives, Conferences, Exhibitions) and Pleasure tourism options considered are described in Table 2. The strategic decision analysis is made based on the case situation as described separately for the choices tourism entrepreneur have is presented in Table 3.

**Table 2:** Understanding Tourism Options / Choices or Categories under consideration

Category	Definition Considered (mainly adopted from UNWTO.org)
<b>Adventure Tourism</b>	Adventure tourism is a type of tourism which usually takes place in destinations with specific geographic features and landscape, and tends to be associated with a physical activity, cultural exchange, interaction and engagement with nature. This experience may involve some kind of real or perceived risk and may require significant physical and/or mental effort. Adventure tourism generally includes outdoor activities such as mountaineering, trekking, bungee jumping, rock climbing, rafting, canoeing, kayaking, canyoning, mountain biking, bush walking, scuba diving.
<b>MICE   Events   Meetings Tourism</b>	To highlight purposes relevant to the meetings industry, if a trip's main purpose is business/professional, it can be further subdivided into "attending meetings, conferences or congresses, trade fairs and exhibitions" and "other business and professional purposes". The term meetings industry is preferred by the International Congress and Convention Association (ICCA), Meeting Professionals International (MPI) and Reed Travel over the acronym MICE (Meetings, Incentives, Conferences and Exhibitions) which does not recognize the industrial nature of such activities.
<b>Pleasure Tourism</b>	Tourism itself being an act of pleasure, all other tourism not covered by above except Health, Wellness and Education Tourism. This includes Business, Culture, Religious, Ecotourism, Sports tourism at all geography, eg. Mountain, Hill and Plain. Including Jungle Safari/Resorts, Hill Resorts, Home Stays including Rural and Urban Tourism.

**Source:** Mostly definitions are adopted from UNWTO.org

Description of alternatives being considered based on the specific case of strategic decision maker’s perspective are presented at the Table 3 below. The situation for strategic decision analysis / making by the tourism entrepreneur is presented in Table 3.

**Table 3:** Case Situation Description, Alternative Tourism Business Sectors

<b>Tourism Sectors</b>	<b>Specific Case Description</b> (Considerations on the Decision Analysis)
<b>Adventure</b>	Considering, non-conventional adventure tourism like mountaineering, streaking, rafting etc., Considered the high potential creative / innovative ventures which are completely new, not being present with given natural and geographical situation   Promoters are less experienced   High Risk   Multiple approvals needed   High potential of Cost of Time overrun, if project development and management is weak   High interest of the local government. Political and Safety issues, Environmental / Natural clearance is needed (depending on specific nature of the project)
<b>Meeting / MICE</b>	Meetings & Events tourism, commonly known as MICE (Meetings, Incentives, Conferences & Exhibitions). Type of tourism in which large groups, usually planned well in advance, are brought together. The activity may be Domestic as well as International Events. Meeting may be relating to Culture, Knowledge, Convention, Conferences, Reality shows, Movie Shooting etc.
<b>Pleasure</b>	Most common & conventional form of tourism. Low risk, Good knowledge and practice. Though, competitive, low margin. This includes Casino, Clubs, Pubs, Bars and many more, Socially and Politically sensitive.

#### 4.1 Comparative Perception of Alternatives of the Tourism Projects

Three options considered for the evaluation are seen from the all three strategic analysis perspectives and are presented in Table 4, the basis for the evaluation of the alternatives is presented in Table 3. The information or the strategic situation ratings are used for the AHP based mobile app Decision Mentor. The Table 4 below is guiding for making judgment at the AHP application with the help of the mobile app for judgement of the alternative tourism projects considered for evaluation.

**Table 4:** Perceived preference of tourism projects under evaluation

<b>Criteria for Tools</b>	<b>Alternatives Preference with Criteria</b>		
	<b>Adventure</b>	<b>MICE</b>	<b>Pleasure</b>
<b>Six Thinking Hats</b>			
White-Information	Very Low	Moderate	High
Red-Emotion	Very High	High	Low
Black-Risk	High	Moderate	Low
Yellow-Opportunity	Very High	High	High
Green-Creativity	Very High	High	Moderate
<b>SWOT</b>			
Strength	High	Very High	Moderate
Weakness	Moderate	High	Very High
Opportunity	Very High	High	
Threat	High	Moderate	Very High
<b>PEST</b>			
Political	Very High	Moderate	Moderate
Economic	Very High	Very High	High
Social	Low	Moderate	Low
Technological	Low	High	Very High

**Source:** Authors, case situations for alternatives

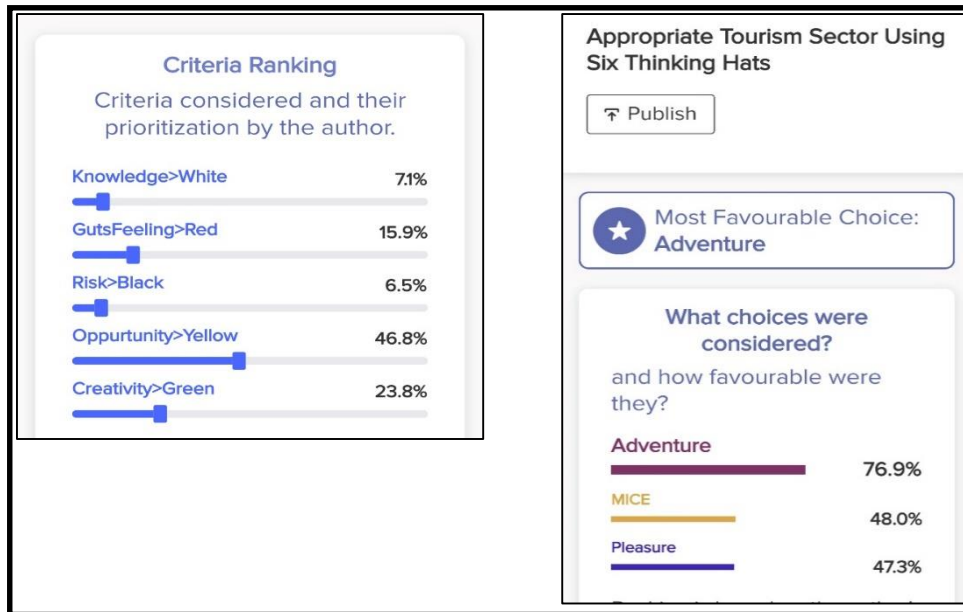
Based on the preference on the alternatives of tourism projects under evaluation with all three strategic tools as presented in Table 4, strategic analysis based on AHP is conducted using Decision Mentor mobile app and described below, Table 5, 6 & 7 presents the AHP hierarchy for each approach, STHs, SWOP & PEST respectively. Similarly Figure 1, 2 & 3 presents the screen shot of output of Decision Mentor app for all the three approaches.

**4.2 Strategic Decision Analysis: STHs, SWOT & PEST using Decision Mentor**

Firstly, Six Thinking Hats is used the project options. The AHP framework is presented in Table 5, which represents AHP hierarchy with decision objective, Criteria and Alternatives. The result of AHP application using Decision Mentor is presented in Figure 1. Secondly, AHP framework for SWOT analysis is presented in Table 6 and the result is presented in Figure 2. Thirdly AHP framework for PEST is presented at Table 7 and result is presented in Figure 3.

**Table 5:** AHP framework in Six Thinking Hats

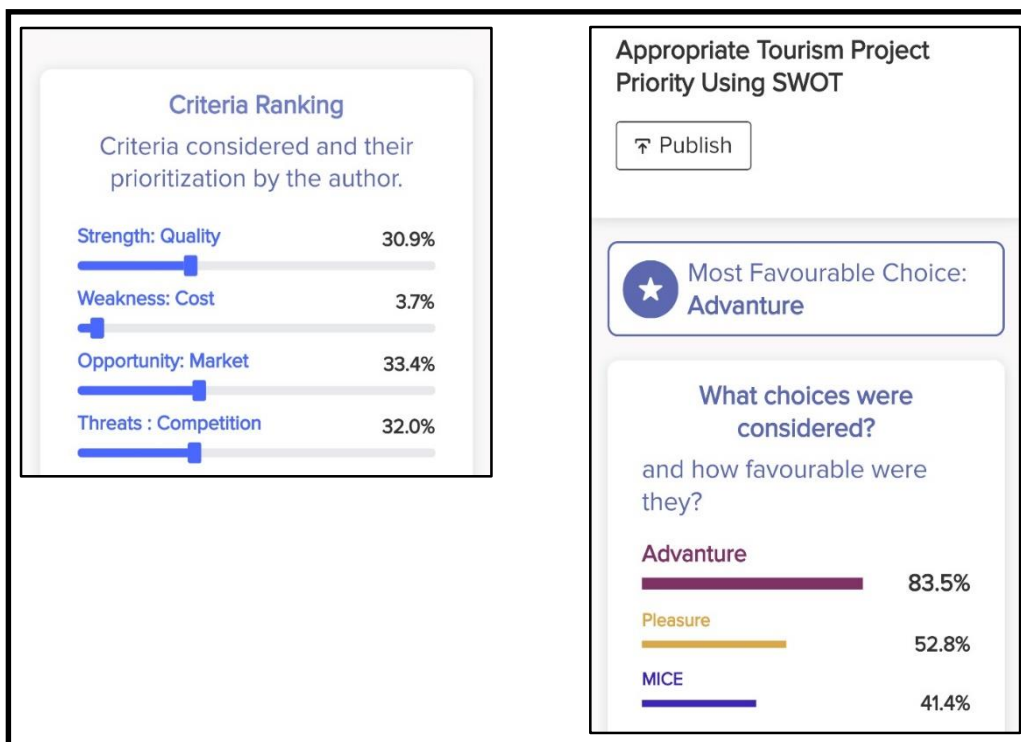
Decision Objective	Criteria Hats	Alternatives to prioritize
Blue Hat: Most appropriate Tourism Venture for Us (for the Team of Founders)	White: Data, Information & Knowledge	Adventure Tourism
	Red: Emotion, Guts Feeling, Confidence	
	Black: Risk and Barriers	MICE Tourism
	Yellow: Opportunity	
	Green: Creativity, Innovation	Pleasure Tourism



**Figure 1:** Decision Mentor Result Screenshots for STHs Analysis for Tourism Project Options

**Table 6:** AHP framework in SWOT Analysis for prioritization of Tourism Projects

Decision Objective	SWOT Criteria	Alternatives
Most appropriate Tourism Venture for Us (for the Team of Founders)	Strength	Adventure Tourism
	Weakness	MICE
	Opportunity	Pleasure Tourism
	Threat / Challenge	

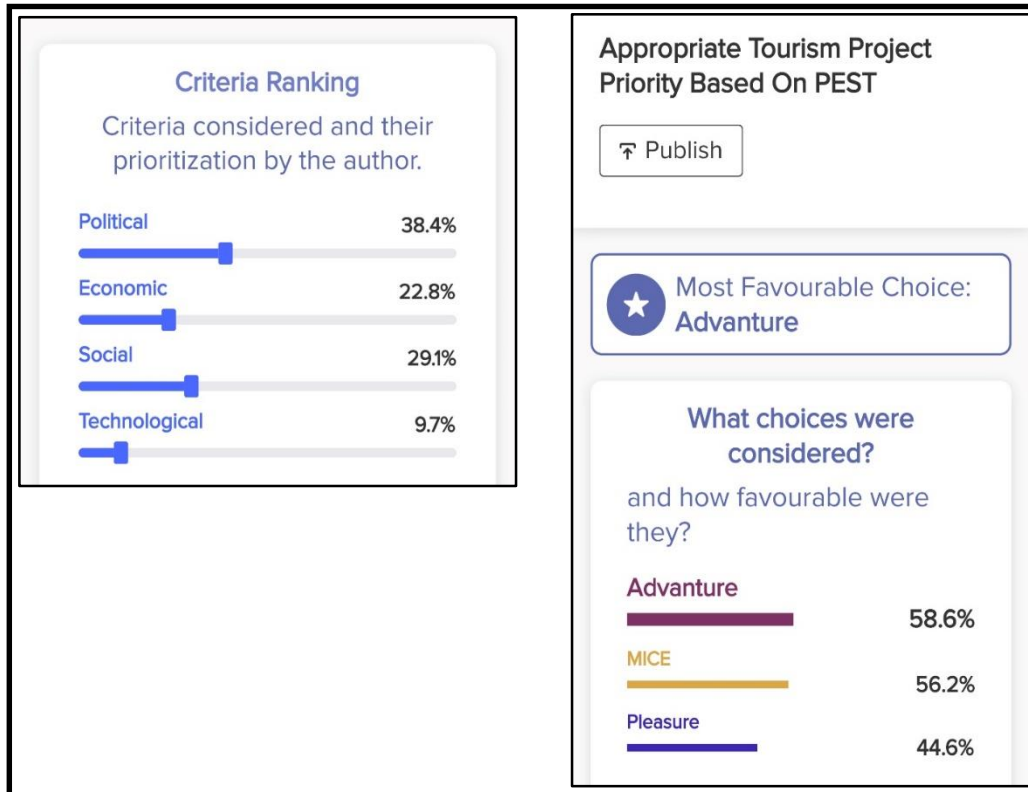


**Figure 2:** Decision Mentor Result Screenshots for SWOT Analysis for Tourism Project Options



**Table 7:** AHP framework for PEST Analysis

Decision Objective	PEST Criteria	Alternatives
Most appropriate Tourism Venture for Us (for the Team of Founders)	Political	Adventure
	Economic	MICE
	Social	Pleasure
	Technological	



**Figure 3:** Decision Mentor Result Screenshots for PEST Analysis of Tourism Project Options

### 5. Results, Discussions and Limitations

The most important experience on working with the case reveals that Decision Mentor app can handle the strategic multiple criteria decision analysis for all three approaches, namely STHs, SWOT and PEST. Further, interesting to see that all three strategic decision analysis resulted Adventure Tourism at the top in ranking with the weight range of 84–59%. MICE and Pleasure tourism remained at 56 – 42% range, almost indifferent on any two options. This is rapid test of Decision Mentor for its applicability with other strategic analysis tool, more in-depth analysis including sensitivity analysis could further enhance the work, which is limitation of the work, in addition to other limited academic rigor needed on the paper.

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