

The Gaming Element Design of an Innovative Financial Learning Tool for Young Adult Learners

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Abstract: Empirical research methods were used to study the motivation factors that may persuade young adults in Thailand to learn finance. We aim to clarify the stimulus factors to acquire financial knowledge and stimulus factors to change financial behavior and demonstrate their importance to incorporate in the game design by integrating psychological theory and empirical findings from the survey of 135 students of Provincial Electricity Authority Electric Vocational School (PEAEVS) aged between 16–19 years old during April 2020. All responses were analyzed through factor analysis and regression analysis methods. The empirical study found seven factors that motivate and effectively facilitate financial education of these young adult learners: 1) awareness for the need of financial skills, 2) awareness for financial planning, 3) future uncertainty, 4) financial satisfaction, 5) communities support, 6) income satisfaction and 7) keeping track of expenses and budgeting. Regression analysis concluded that the need for competency and income satisfaction are highly related to willingness to study financial skills and change financial behavior. The result will be integrated into a framework for further develop innovative financial learning tools.

Keywords: Financial literacy, gamification in finance, motivation, game design, financial education

Introduction

Recent literature on the subject of financial literacy showed that people with insufficient financial knowledge are more likely to make financial mistakes than those who have (Hung, Parker, & Yoong, 2009). International Assessment of Adult Competencies (PIAAC) surveyed adults in more than twenty member countries and revealed that literacy and numeracy skills, prompting the government to find a way to improve it (Bureau, 2015). In Thailand, according to a survey conducting by the Bank of Thailand and the National Statistical Office, Thai people scored 61.0 in financial skills, which included financial literacy, financial behavior, and financial attitude. The score is below the OECD average (Bank of Thailand, 2016). Also, it seems the non-performing personal loan increase continuously in the past decade, especially among the young adult borrowers in Thailand (Chantararat S., Lamsam A., & B., 2017). Having bad debt at a young age could affect future investment capability and hampers the growth and stability of the overall economy. Thus, financial literacy is recognized to be the key to improvement to make Thais achieve financial wellbeing.

Our objective is to shed some light on the factors and motivations that drive learners to study finance. The hypothesis is that motivating factors are identified and included in the design of the financial learning tool; the tool will be able to draw the attention of learners and finally lead to the success in financial education. The specific design of game elements will also be addressed from the empirical study on the motivation of the target group to learn finance and change behavior. There are three main aspects to consider:

- What stimulate people to learn new things?
- What exactly is financial literacy, and how it influences financial wellbeing?
- How to design an effective, innovative financial learning tool?

To achieve our purpose, we conducted an empirical study based on a survey of 135 students from Provincial Electricity Authority Electric Vocational School (PEAEVS) aged between 16–19 years old collected during April 2020. The data is analyzed to find relations between factors and converted into game elements of an innovative financial learning tool. The remaining of this paper is organized as follows: The literature review, Section 2, discusses the concepts of need satisfaction from the psychological perspective in the context of motivation to acquire knowledge. Then it touches upon the scopes and definitions of financial literacy, financial well-being, with the specific focus on the knowledge of personal finance needed for young adults. Methodology in Section 3 describes data and methods used to identify factors that motivate the study of financial skills and the change in the financial behavior of the target group. The results are shown in Section 4, with a proposed research framework for further study. The last section is the recommendation and concluding remarks.

Literature Review

Stimulus Factors to Acquire Knowledge

Stimulus factors used to draw attention are examined in two aspects. One is the factors that push people to learn new things, which in this case, financial knowledge. The other is the factors that help them change their behavior to design an interactive education game tailored to give practical knowledge and presumably leads to the personal financial wellbeing of the learners.

From the psychological point of view, how people behave is motivated by their unfulfilled needs. One of the most popular needs theories is Maslow's hierarchy of needs theory. He proposed that motivation is the result of a person's attempt at fulfilling five basic needs: physiological, safety, social, esteem, and self-actualization. As the name indicates, these needs exist in a hierarchical order meaning that lower-level needs must be met before higher-level needs (Maslow, 1943). On the other hand, the already satisfied need can no longer act as a motivator.

Alderfer (1969) further developed Maslow's hierarchy of needs by categorizing the five-level needs into Existence needs, Relatedness needs, and Growth needs, thus named it ERG theory (Alderfer, 1969). McClelland (1978) stated that all individuals are driven by three motivators: the need for achievement, the need for affiliation, and the need for power. Of these three, which one will be our dominant motivator, largely depends on our life experiences and culture.

Another social psychology theory that aims to describe motivation and behavior is the theory of planned behavior (Ajzen, 1985). It posits individuals make logical, reasoned decisions to engage in specific acts by evaluating the information available to them. Any intentions are determined by a combination of attitude toward the behavior, subjective norms, and perceived behavioral control. In contrast, perceived behavioral control refers to the person's belief that the behavior in question is under their control or not too difficult to execute. This concept is important in designing a learning experience to make learners feel the appropriate level of confidence in their ability to continue with the task. Self-determination theory is a major theory of the new century. It separated intrinsic motivations, the drive to do what one finds interesting, enjoyable, and fulfilling, from extrinsic motivation, which is what one is forced to do. Intrinsic motivation facilitates higher concentration, effort, and task completion. Deci and Ryan (2000) stated three psychological needs that fuel intrinsic motivation underlining choices people make, include competence, relatedness, and autonomy (Ryan & Deci, 2000). These needs are the key to designing a learning experience for the new generation. Competence is the individual's need to feel that they are capable and mastering something while relatedness is the need to make a connection and sharing what they are doing. Autonomy, which is what the new generation valued highly, refers to the need to feel in charge of engaging. Providing the conditions and environments can support the fulfilling of these three needs which in turns will foster the highest quality forms of motivation, which is self-determination.

Apart from factors that influence people to learn, understanding the factors that push them to change behavior is equally important in designing a learning tool. The report Consumer Financial Protection Bureau (2015) defined four types of desirable financial behaviors that must be instilled to consumers (Bureau, 2015):

- Effective routine money management to control impulsive buying;
- Constant research and knowledge-seeking to support informed financial decision-making;
- Financial planning and goal setting; and

- Following through on financial decisions and planning.

Financial Literacy

Financial literacy is loosely defined as knowledge and skills to manage money effectively. However, there are other definitions. For example, the President's Advisory Council on Financial Literacy (PACFL) defined financial literacy as “the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial wellbeing” (Jump\$tart Coalition cited in (Hung et al., 2009)). Similarly, OECD defined financial literacy as: “a combination of awareness, knowledge, skill, attitude, and behavior unnecessary to make sound financial decisions and ultimately achieve individual financial wellbeing” (Atkinson & Messy, 2011). Lusardi, Mitchell (2011) and Huston (2010) define financial literacy as knowledge of financial concepts, aptitude for managing finance, acquiring financial making decision skills, and having confidence in planning (Huston, 2010; Lusardi & Mitchell, 2011).

To be more precise, many works agreed that financial literacy includes the knowledge on interest compounding, inflation, risk diversification, cash-flow management, saving, and investment (Atkinson & Messy, 2011; Hilgert, Hogarth, & Beverly, 2003; Lusardi & Mitchell, 2011). Also, the definition should include the ability to obtain reliable information, ability to process financial information to make an appropriate financial decision, and how to execute financial decisions, monitoring, and adapting to stay on track (Bureau, 2015). However, the proper measurement of financial literacy is debatable, depending on its goal. The United States Consumer Financial Protection Bureau (CFPB) concludes that the best way is to look at its level to improve individual financial wellbeing (Bureau, 2015).

Financial Well-Being

Financial literacy aims to provide financial wellbeing for a person. The United States Consumer Financial Protection Bureau (CFPB) describes financial wellbeing as security and freedom of choice both in the present and in the future. To be more specific, financial wellbeing is having control over day-to-day finances, having the capacity to absorb a future financial shock, having enough financial freedom to enjoy life, and being on track to meet the financial goal (Bureau, 2015).

Evidence suggests that well-informed, financially educated consumers can make better decisions and be in a position to increase their economic security and wellbeing (Hilgert et al., 2003). In her work, O'Neill (2002) explained that a financial wellbeing person is the one who must have the knowledge and understanding of the following: the ability to practice financial goal setting, net worth calculation, cash flow analysis, spending plan, credit card analysis, income tax analysis, insurance analysis, retirement planning, and estate planning. Moreover, it is obvious that to be literate in finance does not automatically mean they will be better off. The education provided must teach the knowledge and instill a healthy routine to make people capable and eventually experienced in managing their financial situation effectively (O'Neill, 2002).

Game Design Elements

Game design elements are the foundation of the gamification application (Deterding, Khaled, Nacke, & Dixon, 2011). In an education context, gamification was widely adopted to both couple with formal education or as the stand-alone learning tool as it can engage, motivate, influence and reinforce learning-related behavior, desired skills and attitude (Buckley & Doyle, 2016; Dicheva, Dichev, Agre, & Angelova, 2015; Landers, 2014). The application of gamification in education is gaining ground in various subjects from Computer Science, Information Technology, game programming, mathematics, science, engineering, (Dicheva et al., 2015), medical (McCoy, Lewis, & Dalton, 2016) and finance (Bayuk & Altobello, 2019).

Creating a game where the player is in control of their financial decision avatars is viable to teach basic and advanced financial skills. The players will be able to choose their financial choices and see their results. These financial decisions will include most of the decisions they would make today and the near future living of their real-life situation.

Method

The research utilized a quantitative research methodology to understand the factors that motivate learning and change financial behavior. These factors will be an integral part of the design of a game that can effectively improve the financial wellbeing of the target group. The methodology comprises three phases.

Phase 1 - Understanding financial literacy, related concepts and factors, and the target population

Upon reviewing the related literature and research, the scopes and factors that influence financial education and behavioral changes among young adults were explored. A group of financial experts and personal financial consultants were interviewed, focusing on their teaching experiences. Representatives of the target groups were also interviewed to understand their basic financial situation, knowledge, and expectation in life. As a result, a preliminary set of questionnaire was developed to include questions about personal characteristics and the factors that motivate financial education and behavioral changes. The questionnaire was inspected by three experts in the field of finance using Index of Item – Objective Congruence (IOC). The experts rated each question and filled in open-ended questions to provide more in-depth analysis and opinion. We analyzed the data with descriptive statistics such as median and quartile deviation, the absolute value between mode and median, and determining indicators with average percentages.

Phase 2 - Selection and assessment of stimulus factors that motivate financial education and behavioral changes

The questionnaire was tested with a group of 30 students of Provincial Electricity Authority Electric Vocational School (PEAEVS) having similar characteristics as the target population. We tested reliability using Cronbach's Alpha Coefficient. Stimulus factors that motivate knowledge acquisition and financial behavioral change were measured by fourteen questions and eleven questions respectively in three different dimensions – financial attitude, social norm, and locus of control – internal and external factors. The Coefficient Alphas for Stimulus factors that motivate financial education is 0.832; Stimulus factors that motivate behavioral changes = 0.716. Both values are higher than 0.7, indicate the internal consistency of the questions.

Phase 3 - Validation of the stimulus factors to acquire knowledge and financial behavior change to integrate into gaming elements of the financial education tool

The questionnaire was administered to 135 students of PEA Electric Vocational School (PEAEVS). The collected data were analyzed with descriptive statistics, Pearson's coefficient, and Factor Analysis. We also examine the relationship between the stimulus factors and the intention to use a financial learning tool to promote financial literacy

Results

Factor Analysis of data from 135 PEAEVS was performed with Varimax rotation on the stimulus factors that motivate financial skills acquisition and behavioral change. The Kaiser-Mayer-Olkin (KMO) of the data was 0.772, indicating that the technique used was appropriate (see Table 1). Bartlett's Test of Sphericity was found to support the model at the 0.000 level of significance.

Table 1. Kaiser-Mayer-Olkin (KMO) and Bartlett's Test of Sphericity of the Data

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.772
Bartlett's Test of Sphericity	Approx. Chi-Square	963.529
	df	300
	Sig.	<.001

The Factor Analysis found seven factors with the Eigenvalues of greater than one, accounting for the cumulative variance of 59.793% (see Table 2).

Table 2. Factor Analysis of the Data

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of	Cum.	Total	% of	Cum.	Total	% of	Cum.
		Var.	%		Var.	%		Var.	%
1	5.649	22.596	22.596	5.649	22.596	22.596	2.682	10.729	10.729
2	2.078	8.312	30.909	2.078	8.312	30.909	2.292	9.168	19.897
3	1.812	7.249	38.158	1.812	7.249	38.158	2.287	9.149	29.046
4	1.578	6.312	44.469	1.578	6.312	44.469	2.242	8.968	38.014
5	1.378	5.513	49.982	1.378	5.513	49.982	1.971	7.883	45.897
6	1.317	5.270	55.252	1.317	5.270	55.252	1.939	7.756	53.654
7	1.135	4.542	59.793	1.135	4.542	59.793	1.535	6.140	59.793
8	.975	3.900	63.693						
9	.886	3.544	67.237						
10	.837	3.349	70.586						
11	.801	3.206	73.792						
12	.756	3.023	76.815						
13	.656	2.625	79.440						
14	.642	2.567	82.007						
15	.587	2.348	84.355						
16	.558	2.230	86.586						
17	.492	1.968	88.553						
18	.483	1.932	90.485						
19	.456	1.825	92.310						
20	.393	1.574	93.884						
21	.374	1.496	95.380						
22	.346	1.384	96.764						
23	.308	1.231	97.994						
24	.265	1.059	99.054						
25	.237	.946	100.00						

Rotated component matrix extracted stimulus factors that motivate and effectively facilitate financial education of these young adult learners from 25 indicators into 7 factors:

- 1) the awareness for the need of financial skills,
- 2) the awareness for the need for financial planning,
- 3) the future uncertainty,
- 4) the financial satisfaction,
- 5) the community's support,
- 6) the income satisfaction, and
- 7) the recording of income and expenditure (see Table 3).

Table 3. Factor Analysis with Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
Awareness for the need of financial skills							
Believe that financial knowledge can be learn and apply in real life	.760	-.042	.133	.005	.239	-.039	-.197
Plan to be an expert/skillful in finance	.733	.143	.219	-.032	-.105	-.094	.087
Expect higher income in the future	.592	.097	-.015	.376	.020	.027	.100
Interested in financial knowledge that is related to daily life	.502	-.093	.378	.128	.389	.189	-.063
Awareness of the need for financial planning							
Always have plan for saving, spending, and incurring debt	.053	.809	.020	.047	-.005	-.055	.103
Have regular spending plan and avoid impulsive spending	-.011	.716	.196	-.020	.065	.144	-.164
Always have plan and careful decision about financial matter to be safe from risk	-.151	.580	.396	.115	.190	-.021	.067
Always keep record of income and expenditure	.389	.549	-.207	-.067	.093	.187	.000
Awareness of the need for financial management							
Always research before making financial decision	.325	.205	.648	.176	-.034	-.135	.085
Have own method of saving	.076	.174	.619	-.163	.341	.033	-.179
Concern about economic situation e.g. rising price of goods	.179	.043	.532	.163	.117	.173	.221
Interested to learn financial knowledge with social group(s) e.g. worker union	-.006	.108	.485	.361	.079	.360	-.256
Interested to acquire financial knowledge if convenient	.393	-.066	.398	.383	.071	.245	.013
Satisfy that current income is sufficient for spending	.116	.045	.013	-.766	-.004	.164	-.204
Income satisfaction							
Want to have up-to-date financial knowledge and skills	.231	.099	.141	.608	.302	.196	-.136
Believe that financial knowledge will lead to better financial behavior	.334	.059	.202	.518	.373	.050	-.222
Have financial target(s) e.g. saving to get married or have a kid	.253	.392	.287	.467	-.123	.191	.122
Interested in investment for wealth accumulation	.384	-.064	.342	.404	.110	.248	-.114
Communities support							
Consider working community a factor that influence positive change in financial behavior	.085	-.023	.043	.178	.719	.032	.248
Consider family the main factor that influence positive change in financial behavior	.045	.171	.212	.010	.696	.070	.060
Awareness of future uncertainty							
Worried about being out of work	-.085	.039	.061	.024	.016	.782	-.023
Worried about saving for retirement	.096	.345	.022	.120	.317	.584	.053
Will change job if offered better payment	-.017	-.176	.220	-.212	-.370	.453	.356
Financial status satisfaction							
Requested by current employer to improve financial behavior	-.145	.021	-.003	.032	.249	-.073	.760
Satisfy that current income is sufficient for spending	.230	.059	.038	.065	.004	.509	.606

Extraction Method: Principal Component Analysis.

 Rotation Method: Varimax with Kaiser Normalization.^a

a. Rotation converged in 24 iterations.

Table 4 shows comparison between stimulus factors from literature and factor analysis. Indicators were grouped as new factors e.g. worried about being out of work from stimulus factors to acquire knowledge was grouped as an indicator of awareness of future uncertainty, always research before making financial decision from stimulus factors to change behavior was grouped as an indicator of awareness of the need for financial management.

Table 4. Comparison between Stimulus Factors from Literature and Factor Analysis

Factors from Literatures	Factors from Factor Analysis
Stimulus factors to Acquire Knowledge	Awareness for the need of financial skills
Concern about economic situation e.g. rising price of goods	Believe that financial knowledge can be learn and apply in real life
Worried about being out of work	Plan to be an expert/skillful in finance
Interested to learn financial knowledge with social group(s) e.g. worker union	Expect higher income in the future
Interested in investment for wealth accumulation	Interested in financial knowledge that is related to daily life
Have own method of saving	Awareness of the need for financial planning
Satisfy that current income is sufficient for spending	Always have plan for saving, spending, and incurring debt
Worried about saving for retirement	Have regular spending plan and avoid impulsive spending
Interested in financial knowledge that is related to daily life	Always have plan and careful decision about financial matter to be safe from risk
Believe that financial knowledge can be learn and apply in real life	Always keep record of income and expenditure
Plan to be an expert/skillful in finance	Awareness of the need for financial management
Expect higher income in the future	Always research before making financial decision
Not satisfy with current financial status	Have own method of saving
Will change job if offered better payment	Concern about economic situation e.g. rising price of goods
Interested to acquire financial knowledge if convenient	Interested to learn financial knowledge with social group(s) e.g. worker union
Stimulus factors to Change behavior	Interested to acquire financial knowledge if convenient
Always research before making financial decision	Satisfy that current income is sufficient for spending
Always keep record of income and expenditure	Income satisfaction
Have regular spending plan and avoid impulsive spending	Want to have up-to-date financial knowledge and skills
Always have plan for saving, spending, and incurring debt	Believe that financial knowledge will lead to better financial behavior
Always have plan and careful decision about financial matter to be safe from risk	Have financial target(s) e.g. saving to get married or have a kid
Have financial target(s) e.g. saving to get married or have kid	Interested in investment for wealth accumulation
Consider family the main factor that influence positive change in financial behavior	Communities support
Consider working Community a factor that influence positive change in financial behavior	Consider working community a factor that influence positive change in financial behavior
Requested by current employer to improve financial behavior	Consider family the main factor that influence positive change in financial behavior
Believe that financial knowledge will lead to better financial behavior	Awareness of future uncertainty
Want to have up-to-date financial knowledge and skill	Worried about being out of work
	Worried about saving for retirement
	Will change job if offered better payment
	Financial status satisfaction
	Requested by current employer to improve financial behavior
	Satisfy that current income is sufficient for spending

These seven factors explained 13.6% of the total variance in the intention to use game as financial education tool, with statistical significance ($p < 0.05$) (Table 5 and Table 6).

Table 5. Model Summary of the Data

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.369 ^a	.136	.089	.95463415

Table 6. Analysis of Variance of the Data

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.262	7	2.609	2.863	.008 ^b
	Residual	115.738	127	.911		
	Total	134.000	134			

Coefficients of regression analysis indicates that not all standardized coefficients are significant ($p < 0.05$). There are two factors; the need for competency and income satisfaction, that have a relationship with the intention to use the game as a financial educational tool in a negative way (see Table 7). A possible explanation is that those who plan to be an expert in finance do not regard educational game as a suitable mean to achieve their goals.

On the other hand, those who are unsatisfied with their income would be keener to use a game as their financial learning tool. Therefore, to achieve the goal of increasing target group's financial literacy, a game designer would emphasize in basic financial knowledge e.g. saving, spending, planning etc. to draw attention of this target group. In other word, these two factors must be highlighted in the framework when designing an innovative financial learning tool for young adult learners.

Table 7. Coefficients of the Data

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error Beta			
1	(Constant)	-1.050E-16	.082		.000	1.000
	Awareness for the need of financial skills	-.204	.082	-.204	-2.471	.015
	Awareness of the need for financial planning	.008	.082	.008	.103	.918
	Awareness of the need for financial management	-.092	.082	-.092	-1.113	.268
	Income satisfaction	-.250	.082	-.250	-3.032	.003
	Communities support	.132	.082	.132	1.595	.113
	Awareness of future uncertainty	-.070	.082	-.070	-.854	.395
	Financial status satisfaction	-.039	.082	-.039	-.468	.640

The stimulus factors found in the preceding analyses are used in the development of an innovative financial learning tool, a 'financial game,' for young adult learners. The game should effectively encourage an engagement and provide a positive experience to learners. However, the personal predisposition, including the financial attitude of a learner, could affect the desirable result, which in this case, the increase of financial literacy level. The authors then propose a conceptual framework for the future research, as shown in Figure 1.

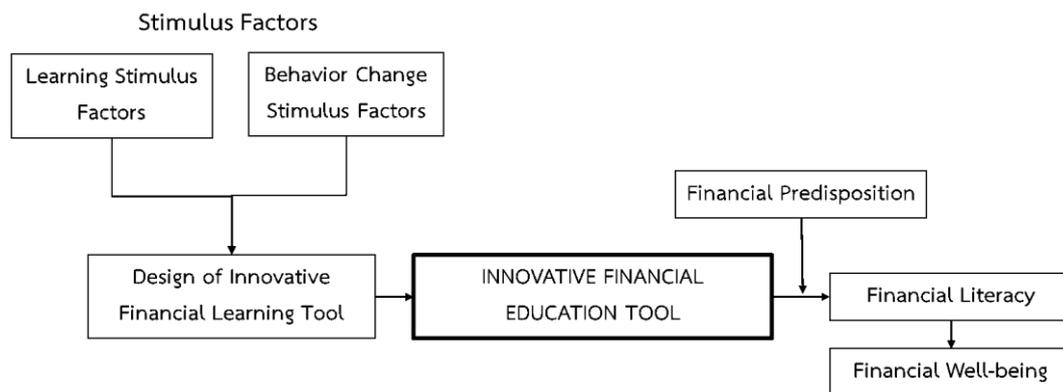


Figure 1. Proposed Conceptual Framework of Innovative Financial Learning Tool for Young Adult Learners, 2020

Conclusions and Recommendations

This paper aims to understand the stimulus factors affecting the motivation to acquire financial knowledge and change the financial behavior of young adults. Results indicated that educators and game developers should focus on the need for competency and income satisfaction factors. They are the most significant factors in designing the educational tools that will better engage young adult learners to improve their financial literacy and enable them to apply this knowledge in real-life situations. The financial game should introduce activities that can help change people's behavior and teach skills regarding financial literacy. Both intrinsic motivation and extrinsic motivation are equally important. Educators must carefully consider when designing the learning tools or methods to promote a positive learning experience, motivate action, and engage people to learn and make more confident and efficient decisions.

Carefully designed games that focus on intrinsic motivators would contribute positively to the experience of the players. This study hence provides an initial understanding of students' intrinsic and extrinsic motivations to learn finance, the complex subject that many do not want to understand to design a fun and engaging financial learning tool. Although the awareness for the need for financial skills and income satisfaction is found significant in this study, other factors identified from literature cannot be ignored entirely. The factors that deserve further attention and include in the financial game as well are the awareness for financial planning, future uncertainty, financial satisfaction, community support, and the recording of income and expenditure. In future works, the author will explore the outcome of the financial game designed following the results of this study. The motivation factors mentioned will guide the designing to create a game that provides a good experience for players and hopefully lead to an increase in financial literacy level.

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