# Persuasive narrative advertisement generator: A microenterprise service innovation perspective

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**Abstract** In the era of the service economy, service innovation is a means to cope with fierce competition within a fast-changing industry. However, most microenterprises are at a competitive disadvantage in that they have limited resources and information for putting service innovation into their business practice. Owing to their inferior situation, microenterprises often do not think service innovation is related to them, nor do they have the bravery to engage their innovation endeavors. This paper presents a novel and automatic approach that can generate persuasive narrative advertisements in the form of customized motivation stories intended to encourage microenterprises to consider innovation just as the protagonist does in a story. This study adopts a three-act structure as the story framework and takes advantage of Story of Mind elements, service innovation types and microenterprise individual information as the story elements. Our approach and its information system uses Probabilistic Extended FSMs to model the story frameworks and the story elements. The approach proposed here has preliminary been justified through the observational and analytical evaluation method and is believed to shed light on the development of automated persuasive narrative communications for electronic services.

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## 1 Introduction

The importance of service in the global economy has grown steadily while the importance of goods has declined. Services are believed to be one of the main drivers of technical changes and economic progress (Czarnitzki and Spielkamp 2003). Services refer to the application of knowledge, competences or skills through deeds, processes, and performances for the benefit of another entity or the entity itself (Vargo and Lusch 2004). For this reason, companies are constantly seeking to provide better services through service innovation. Microenterprise (a type of small businesses of which the owners often serves their customers directly and each has five or fewer employees) are also facing the same kind of fierce competition. To survive, microenterprises must put some effort toward (Sun and Wu 2008). Although microenterprises require service innovation to continue improvements in their business, most of them do not know how to put it into practice, not to mention the fact that some microenterprises have no ideas about how to confront fierce competition or they are unaware that what they actually need is service innovation. This could seriously harm the overall economic growth in countries where their majority of industries are dominated by microenterprises and small enterprises.

Some studies have mentioned innovation motivation, and case studies have been done in this area of research. For example, Li and Feng (2007) explored commercial banks in a survey-based empirical study to discuss service innovation motivation. The result shows that strategic management and organizational factors play a vital role in driving service innovation by commercial banks. Berry et al. (2006) advocated market-creating service innovation as the motivation for communication, using Google, eBay or Rent-A-Car as examples.

However, the above strategies often fail to consider the persuasion of microenterprises (i.e., their owners) to engage in service innovation, but rather focus on large enterprises like Google with many employees and resources. In addition, persuasion is intricately dependent on the combination of different contextual and individual factors (Meyers-Levy and Malaviya 1999). The cognitive-response model of persuasion (Wright 1980) suggests that persuasion reflects the favorableness of the cognitive responses evoked by the message content. The experiential model of persuasion (Dunlop et al. 2010) emphasizes self-referencing (i.e., message content is processed by relating it to aspects of the individual's experiences) and emotional responding (i.e., feelings arising from self-referencing). Moreover, the more related the message content is to the context, the more persuasive it is (Wright 1980) (Chutijirawong and Kanawattanachai 2014). Accordingly, innovation motivation messages required by microenterprises should be closer to their owners' contexts and experiences, letting microenterprises know why they need to do service innovation and understand that only by doing service innovation can they help their precarious business (if applicable).

There have been few attempts to persuade microenterprise owners to engage in service innovation. This paper argues that we can use message contents as short customized motivational stories functioning as persuasive narrative advertisements to encourage microenterprises to do service innovation. In addition, story-based communication could be highly applicable to service advertising (Mattila 2000). A narrative is a story that is created in a constructive format describing a sequence of fictional or non-fictional events. Narratives are uniquely effective in portraying and conveying experiences (Boller 1988), and story-based appeals might be especially effective for communicating the value of experiential services (Padgett and Allen 1997), (Lundqvist et al. 2013). For this reasons, we propose that microenterprise owners can be inspired by short customized motivational stories, and can attain some ideas about how to implement service innovation in their business.

Motivating stories should be created based on the microenterprise's situation; high similarities of the story plot will create a sense of empathy on the part of the microenterprise and makes the story more convincing. Schmitt (1999) mentioned that only by linking an individual owner's psychological perspective to this/her life experience and touching their memory can something truly impact his/her mind thoroughly. When imagining events, people frequently think about their own actual or potential behaviors, creating behavioral scenarios, similar to stories, in which they are the main character (Escalas 2004).

In order to achieve the customized purpose, this study aims to develop a novel and automatic approach that can create persuasive narrative advertisements to encourage microenterprise owners to do service innovation. These persuasive narrative advertisements are in the form of customized

motivational stories that can reinforce the microenterprise owners' courage to carry out innovation in their enterprises just as the protagonists do in a story. This approach takes advantage of the probabilistic extended FSM method (Cheng and Krishnakumar 1993) to model different content-decision predicaments in stories for microenterprises, resulting in a Persuasive Narrative Advertisement Generator (PNAG).

In order to ensure a story can be generated automatically, PNAG adopts Dramatica (Phillips and Huntley 2001) as part of the elements required. The Dramatica theory of stories provides structural guidelines to clarify communication and the artistic techniques for enhancing story style. Responding to different demands for innovation, the four innovation types, including process, offering, delivery and finance (Keeley 1999), are also regarded as story elements in PNAG. PNAG combines the two kinds of elements and uses "three-act structure" to render stories. Three-act structure is a model used in writing and evaluating modern storytelling which divides a screenplay into a three parts called the setup, confrontation and resolution (Field 1979). Most story models and dramatic approaches are more or less derived from the classical three-act structure of Aristotle providing an arc model with exposition, rising action to climax and denouement (Gobel et al. 2006).

The attempted contributions of PNAG are two folds: (1) automated narrative advertisement generation for persuading microenterprise owners to do service innovation using mini customized motivational stories; (2) compared with existing approaches of story generators that are often based on a fixed limited set of story elements, PNAG features flexibility and dynamism in constructing mini stories with "familiar individual experience" to motivate microenterprise owners.

The remainder of this paper is organized as follows. Section 2 discusses the literature which provides the required foundations for constructing our PNAG. Section 3 presents the basic concepts of our method, followed by descriptions of the method's system framework and its component modules. Section 4 then offers preliminary evaluations and findings. Finally, concluding remarks are provided in Section 5.

## 2 Literature review

Because our objective is to encourage the target microenterprise owners to do service innovation, an investigation of motivation and incentive could begin with an innovation-decision process (Fig. 1) (Rogers 1962). Studies of the diffusion of innovation suggest that decisions are not made immediately as part of the personal innovation-decision process; instead, decisions occur over a period of time with multiple actions. Rogers (1962) proposed five major stages including knowledge (being exposed to an innovation's existence and understanding the function of innovation), persuasion (forming a favorable or unfavorable
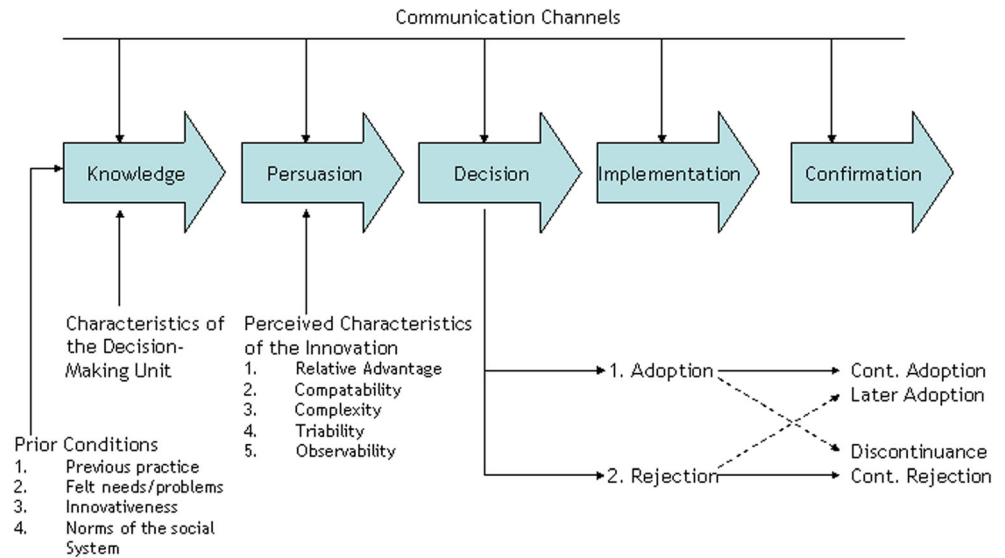
attitude of innovation), decision (acting by accepting or rejecting), implementation (putting a new idea into use) and confirmation (seeking further confirmation of the previous decisions; if they encounter opposing information, decision-makers may reverse these previous decisions).

In this study, we focus on the knowledge stage and the prior conditions (Fig. 1) because these are crucial moments for investigating the motivation of innovation. Hassinger (1959) argued that individuals seldom notice the information of innovation until they begin to feel that they need this innovation. In other words, unless this innovation is considered to be completely congruent with the individual's mentality or requirement, contact with innovation is meaningless (Rogers 1962). This process is a selective perception, where a personal mentality and conviction are used to interpret the communicated message (Rogers 1962). Selective exposure and selective perception suggest that needs for an innovation usually precede awareness-knowledge of innovation.

The needs of motivation can often be classified into two categories, physiological needs and psychological needs. Based on Abraham Maslow's (1943) theory, activities related to human needs all belong to motivated behavior. From the basic physiological need to the complex needs of self-actualization, Maslow divided human needs into five categories (including physiological needs, safety needs, love needs, esteem needs and self-actualization needs). Maslow (1969) proposed Theory Z which mentions the over actualization level. If self-actualization needs are fully satisfied, a short-lived experience called over actualization will appear. This usually appears when an individual is implementing something or accomplishing something. It is the experience of ecstasy and transience. Maslow claimed that if low-level (physiological needs) needs are fulfilled, high-level needs (psychological needs) will occur immediately. In other words, the theory of motivation satisfaction and shortage contains the same

important concepts. This is because satisfaction allows low-level needs to reach the next level and the shortage of the current level will make people commit to addressing this shortage. In this study, we consider the role of Maslow's hierarchy of needs in generating persuasive narrative advertisements through customized motivational stories. The background of this type of story is discussed below.

## 2.1 Narrative advertising

This subsection aims to explain why we locate our settlement mechanism as an advertisement, and communicate with our target microenterprises in the form of stories which we refer to as service advertising-like stories.

From the point of view of the function of advertising, some scholars suggest that general advertising objectives should include informing, persuading, and reminding consumers (Kotler et al. 1996) (Chiu et al. 2012). Colley (1961) defined the goal of advertising as specific communication issues which must be reached to a certain extent in a certain period of time for a specific audience. This is the functional side of the advertising which corresponds to our target goal (encouraging our target microenterprise owners to engage in service innovation) which we define as "advertising-like".

Studies of advertising have emphasized the emotions of people which could affect advertising (Holbrook and Batra 1987) (Peterson et al. 1986). Many previous studies have examined advertisements based on the customer's perspective (not only popularizing the features of the product, but focusing on the experience, emotion, culture and lifestyle of the customer) (Celsi and Olson 1988).

Based on Bruner (1987, 1993), (Lundqvist et al. 2013), advertising which describes the actor's (or brand's) needs to achieve some objective can be interpreted through the narrative modes of thought because people often use stories as a

way to express some stimuli. The narrative mode of thought could be divided among the branches of narrative theory and narrative psychology, which can represent experience through the form of the story and allow people to comprehend the stimuli of the story.

Narrative theory suggests that people relate their interpretations of experience to others through narrating, or telling stories (Padgett and Allen 1997). Narrative deals with the fluctuation of human intention (Bruner 1987), with an involved, self-relevant reflection on experience. Bruner (1987) also suggested people can use the narrative mode of thought to understand story stimuli. Hence, according to Bruner (1987), advertisement that portray actors (characters or brands) acting to achieve some goal can be interpreted through narrative theory because people (i.e., our target microenterprise owners) can interpret the stimuli of the advertisement through the story (Padgett and Allen 1997). In addition, Lewis and Bridger (2001) also said that if a business wants to convince consumers, in particular new consumers, it is necessary to compile the kind of story that can transmit messages and cause consumers to identify.

Understanding experience is a conduct falling into the domain of narrative psychology (Robinson and Hawpe 1986). Narrative psychology is considered as the storied nature of human conduct (Sarbin 1986). In other words, narrative psychology is about how people deal with experience by constructing a story or listening to others' stories. Bruner (1987, 1993) suggested there are two modes of cognitive functioning in relation to the order of experience, the paradigmatic and the narrative modes of thought. The paradigmatic modes of thought attempts to achieve an idea of a formal, mathematical logic system to interpret and describe experience. On the other hand, the objective of narrative modes of thought is to understand the story's stimuli, and include the causally/chronologically connected events enacted by characters (including ad form or presentation format—drama, song, dance, mime, etc.).

In sum, to convince other microenterprise owners to carry out service innovation, we need to start from their past experiences. Based on the perspective of narrative psychology in understanding experience, telling stories is one useful form of narrative. That is, an individual's experiences can be interpreted through the narrative mode as are the stories about experiences told to us by others.

## 2.2 Story generator

In this section we consider the domain of the story generator for the automatic generation of service advertising-like stories. The ultimate objective of our study is to generate customized service advertising-like stories based on every different target microenterprise. For this reason, the story generator proposed must have two important characteristics, customization and automation.

As follows are some exemplar types of existing generators:

(a) Constructing a rule-based approach for the text processing (Correira 1980).
(b) Interacting with a user and adapting the behavior of the user to generate the story (Barber and Kudenko 2007).
(c) Utilizing a given input set of elements, such as backgrounds, characters and objects for the user to choose from and then generating the story (Hong et al. 2008).

Correira (1980) proposed Story Tree based on the rule-based computational model for text comprehension. The theoretical basis is the macrostructures proposed by Kintsch and van Dijk (1978). The simple formulation A <= B, C, and D was proposed by Kintsch and van Dijk (1978). The meaning of the formulation is that you may assert the truth (presence) of macrostructure A if you can find the (nearly) contiguous propositions B, C, and D present in the input text (Correira 1980). The rules of coherence could involve several criteria: causal connectedness (B causes/is the result of C, which causes/is the result of D), or temporal ordering (B happens before/after C, which happens before/after D). Correira (1980) organized this macrostructure into tree hierarchies and described their interrelationships in rule-based story grammars, and other similar approaches include TALESPIN (Meehan 1977), etc.

Simply put, Story Tree is a series of existing plots of a story, constituted in the form of a tree structure. For maintaining the continuity of the sentence's purpose, the structure of each node of a sentence is formed by the concept of formulation: A <= B, C, and D. Under this circumstance, the stories are generated steadfastly and are written in advance. On the other hand, there is an interactive way for the system and the users to generate a story. Barber and Kudenko (2007) proposed a structure of system that can generate interactive stories and adapt to the user's behavior (Fig. 2).

The knowledge base consists of the information of the characters, story action, and the dilemmas which can occur in the story world. In order to make sure that the dilemmas which may be chosen by the user are met within the story world, the narrative generator (planner) finds out the possible dilemmas and lets users choose based on the situation of the current state. Figure 3 is the overview of the system moving between states dependent on plans, dilemmas and user decisions (the part of the relationship between the narrative generator and user). Based on the
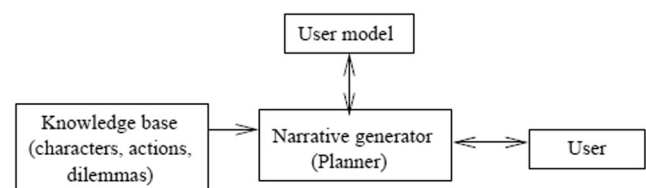


**Fig. 2** System components and their interactions (Barber and Kudenko 2007)
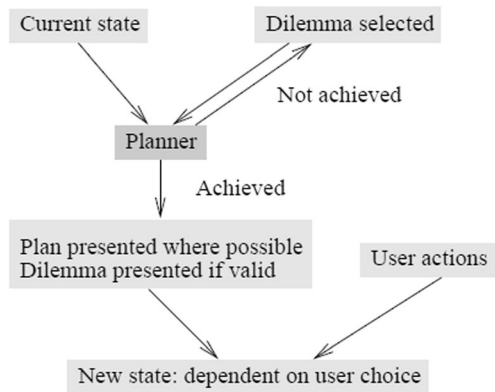
**Fig. 3** The overview of the system moving between states based on plans, dilemmas and user decisions (Barber and Kudenko 2007)

situation of the current state, the planner selects the appropriate dilemma and lets the user make a choice, and then decides the next state dependent on the user's choice.

The function of the user model is to achieve the aims of predicting the user's decisions based on accurate presentation of a dilemma. This model is used to identify which decision is the user's most likely choice, and build up by observing assumptions made in previous user actions. Other similar exemplars include AUTHOR (Callaway and Lester 2002) for narrative creation.

The last exemplar type of approaches is Picture Books (Hong et al. 2008) which was an automatic story generator that generated stories for children from a given input set of picture elements (backgrounds, characters and objects). Background is critical for setting up the story and combining the object to decide the theme of the story. The linkage among the backgrounds, object and the story theme are defined by the author. For example, if the user chooses the bedroom as the background, the associate objects may be the lamp or the toy block. Integrating the bedroom as the background and the lamp as the object will generate a story theme about the bravery (defined by the author). Such associations in Picture Books are manually determined and entered into the database.

On the other hand, the plots of Picture Books are subdivided into four subplots, namely the problem, rising action, solution and climax. Each subplot contains at least two author goals which represent the goal of the scene and the corresponding consequence of the goal and each author goal contains one or more character goals which represent an action performed by the character for the purpose of achieving the author goal. Table 1 shows an example of the first subplot in a Picture Book.

Similar to the Picture Book, another new architecture, SU-MO, was developed (Cua et al. 2010). Instead of creating associations among the backgrounds, characters and object manually and encoding them into narrative knowledge, these associations are inferred automatically through axioms that should be commonsense in SUMO (Table 2).

Figure 4 is the architecture of SUMO. The story editor processes the generation of assertions which correspond to

**Table 1** The example of a Picture Book (Hong et al. 2008)

| Subplot #1 | |
| --- | --- |
| Author goal 1.1: | |
|    Goal of the scene | Child is doing an activity |
|    Character goal | *<character> plays <object>* |
|    Resulting text | *Rizzy the rabbit played near a lamp.* |
| Author goal 1.2: | |
|    Goal sequence | Child caused a problem |
|    Character goal | *<character> destroys <object>* |
|    Resulting text | *Rizzy broke the lamp.* |

the input picture elements specified by the user, and the story planner plans the flow of events in the story based on the SUMO logic which decides the subsequent actions based on the character's emotions. This is similar to an emerging new area of research field that brings together computation and narratology concepts as did in Curveship (Montfort 2011).

In sum, existing story generator works utilize rule-based sentence structure, (Meehan 1977), (Correira 1980), interactive approach to reference the determination of the user (Callaway and Lester 2002), (Barber and Kudenko 2007), or the story plot that combines backgrounds, characters and objects, such as Picture Books (Hong et al. 2008), SUMOs (Cua et al. 2010), Curveship (Montfort 2011).

This study aims to generate a customized service advertising-like story based on each different target microenterprise automatically. Our study does not involve the aspect of interactive story generation because we want our story to serve as an advertising-like story, allowing microenterprise owners to read the stories directly instead of interactively. However, if we want to achieve the aim of customization, we need opinions and information from our target microenterprise owners to allow interactive story generation. For this reason, we need to find out a method to anticipate the information and opinions in our story to facilitate the advantages of interactive story generation methods. Referencing Picture Book (Hong et al. 2008) and SUMO (Cua et al. 2010), we can reference their methods to customize the inputs required by the interactive story generation methods in customized domains. Meanwhile, we can also reference the tree-like structure (Correira 1980) to form the story plots and combine them with a set of the microenterprise owner's opinions and

**Table 2** An example axiom to represent a female child Rabbit Character whose name is "Rizzy" (Cua et al. 2010)

```
(=>
    (and
        (instance ?RABBIT RabbitCharacter)
        (attribute ?RABBIT Female)
        (attribute ?RABBIT Child))
    (name ?RABBIT "Rizzy"))
```
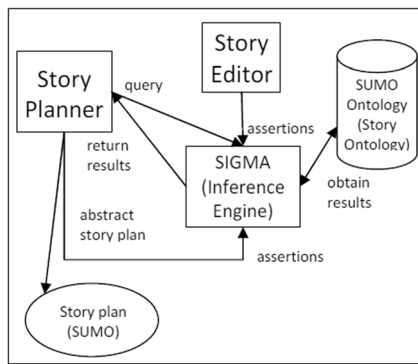
**Fig. 4** The architecture of SUMO (Cua et al. 2010)

information elements to generate a customized service advertising-like story.

## 3 PNAG methodology

PNAG aims to develop an automatic approach that can create persuasive narrative advertisements in the form of customized motivational. These stories should encourage microenterprise owners to innovate their enterprises just as the protagonist does in a story. This encouragement is connected to the intrinsic motivation engagement based on the Maslow's hierarchy of needs theory (Maslow 1943), using persuasive narrative advertisements. Persuasion refers to the compatibility defined as the degree to which an innovation is perceived as consistent with existing values, past experiences, and the needs of potential adopters (Rogers 1962). This kind of compatibility helps the individual give meaning to a new idea based on personal experience so that it is regarded as more familiar

In order to achieve the aforementioned ends, the information system framework of PNAG is designed and presented as in Fig. 5. This system framework consists of two main modules, including: the microenterprise Information Module and Probabilistic Extended FSM Module (including four small modules: the microenterprise Classification Module, Story Framework Identification Module, Story Element Suggestion Module and Matching Module). In essence, based on the Microenterprise Information Module's analysis of microenterprise information, the Microenterprise Classification Module classifies a target microenterprise based on Maslow's hierarchy of needs theory. The Story Framework Identification Module subsequently chooses a suitable story framework addressing the needs of the microenterprise and innovation appeals, utilizing different sources enriched by the Story Element Suggestion Module. Finally, the Matching Module assembles the story framework and the story elements provided by the Story Framework Identification Module and Story Element Suggestion Module, generating customized motivational stories.

### 3.1 Microenterprise information module

The microenterprise Information Module is designed for comprehending the essence of microenterprises. At the beginning, we let microenterprises fill in the tabulation, and get some basic information as needed. The information about the current situation of an microenterprise includes their basic information, socioeconomic status and cultural background. After analyzing this information, the microenterprise Information Module engenders two kinds of data, including a user i context table ($C_{ij}$) at the current state (for the purpose of running extended FSM in the Probabilistic Extended FSM Module) and the microenterprise personal element (for the purpose of enriching the story).

**Fig. 5** PNAG Information System Framework
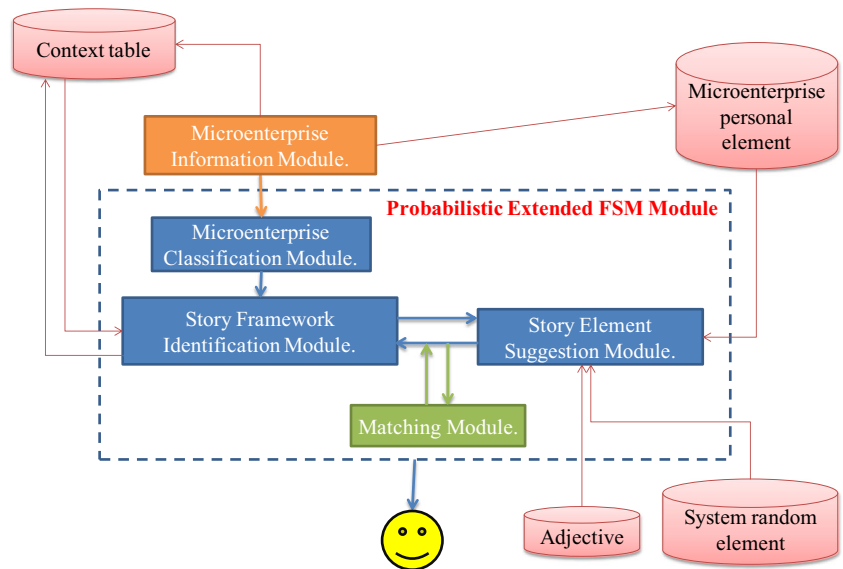
## 3.2 Probabilistic extended FSM module

In this part we use probabilistic extended FSM to generate stories. FSM (finite state machine) is a model containing a set of states, and each state represents a condition. In addition, there is a transition function in FSM that moves the current state to the next state. We use this distinguishing feature of FSM to build our story framework, and each state expresses an element from Dramatica (Phillips and Huntley 2001) and the innovation type states which can generate the paragraphs of the story. We utilize the microenterprise's basic information to complete the transition function in the FSM, moving from the start state to the end state, and generate a motivating story. In the transition part, we subjoin hybridization between probabilistic and extended finite state machines. Because motivational stories need to be vivid and touching, we need to diversify according to probability when choosing the next state. On the other hand, our goal is stimulate our target microenterprises, and it behooves us to measure if the current qualifies to move to the next state, and according to the situation of the current, we can then create the paragraphs of the story. In an extended FSM model, the transition satisfies the trigger conditions of each state first (through the input alphabet), and then moves to the next state and implements the specified data operations (the output alphabet) (Cheng and Krishnakumar 1993). In addition, the purpose of combining probabilistic FSM to the extended model is to subjoin the diversity and interest in our story and avoid situations where the same microenterprise owner always reads the same plot and thus looses interest.

Figure 6(a) shows the schematic diagram of the probabilistic extended FSM. If the input alphabet of context table $C_{11}$ conforms to the trigger conditions in $S_0$ (the initial state of probabilistic extended FSM), then the specified data operations will be implemented, including the current story paragraphs $G_{11}$ and the output alphabet of rewrite context table $C_{12}$, and the state $S_0$ will be moved to the next state $S_1$ or $S_2$ according to a random probability p. It is worth noting that the trigger conditions of each state are the content of the context table and the microenterprise owner behavior (which is also recorded in the context table). If the context table conforms to the trigger conditions, the next state will be shown based on the content of the context table and $G_{11}$ will be generated. After that, the system will to rewrite the context table into $C_{12}$ based on the microenterprise owner behavior. In Fig. 6(b) (following the concept of extended FSM), we can understand that $C_{12}$ and $G_{11}$ both are generated by $S_0$. $C_{12}$ is generated through the original $C_{11}$ when the user selects continuing to see the story paragraphs ($GV_{ig}$). In addition, to subjoin the diversity and interest in the generated story and avoid cases where the microenterprise owners always reads the same plot and thus looses interest, probabilistic extended FSM is adopted, using a random probabilistic approach to choose which state is the next when the trigger condition of the current state is evoked.

The above mechanism is the kernel of the Probabilistic Extended FSM Module which engenders a story about the protagonist who is analogous to our target microenterprises and processes the course from failure to successful. Moreover, the microenterprise Classification Module, Story Framework Identification Module, Story Element Suggestion Module and Matching Module in Probabilistic Extended FSM Module deal with more detailed processes, including the creation of a touching plot throughout the whole story, more personal associations and greater fluidity in the story.

### 3.2.1 Microenterprise classification module

The microenterprise Classification Module is the first mechanism in the Probabilistic Extended FSM Module. The function of the microenterprise Classification Module is to classify our microenterprise owners into unequal types in order to make customizations for each microenterprise owner based on the background analysis performed by Microenterprise Information Module (the context table). Maslow proposed that personal growth is based on intrinsic motivation, and motivation is composed of multiple levels and the nature of demand. Based on Abraham Maslow's (1943) theory, human needs are all associated with motivated behavior. From the basic physiological need to the complex needs of self-actualization, Maslow divided human needs into five categories. According to Maslow's point of view, we need to encourage people by

**Fig. 6** Probabilistic extended FSM
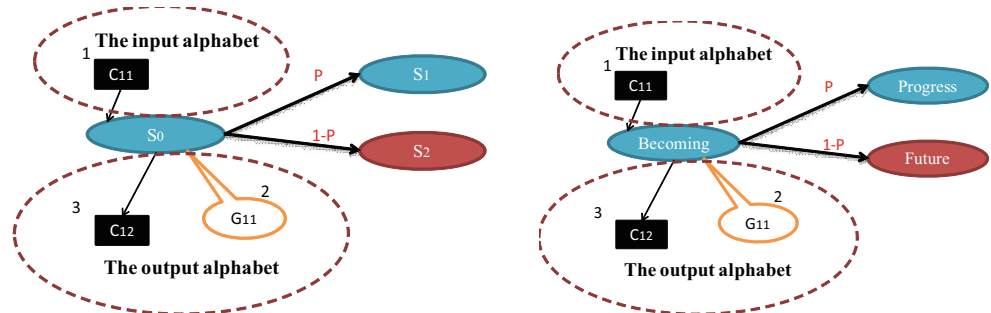


(a) The schematic diagram of the probabilistic extended FSM.

(b) An example of using the 16 story types of Dramatica.

satisfying their shortcomings. This is why this module classifies the microenterprise owners first. In our field observations in Ilan County of Taiwan, we identified the four categories according to types of needs, including safety needs, love needs, esteem needs and self-actualization needs. In addition, for enriching the diversity of our story, the plot of the story can take two directions: learning and cooperation, as shown in Fig. 7.

In the Microenterprise Information Module, a microenterprise owner makes some choices and fills in the context table $C_{ij}$. We let the microenterprise owner decide the value in each attribute, such as their performance against other competitors, the satisfaction of the demand for innovation, operating conditions, *etc.* The sum of the attributes normalized values is used to decide which of the needs in Maslow's hierarchy for the microenterprises (i.e., by using equidistance of the sum value to achieve classify the microenterprise within one of the four levels in Maslow's hierarchy of needs - safety needs, love needs, esteem needs and self-actualization needs.

Because the purpose of our story is to achieve maximum satisfaction for each microenterprise, we do not rank our target microenterprises. Instead, we let the microenterprises to survey their own level of self-satisfaction. According to this classification level, choosing low level cooperation needs means the microenterprise wants to improve itself more, and the system will give it a model story to imitate. On the other hand, an microenterprise who selects a high level of cooperation needs indicates the need for more support from others, and the system will give it a story about cooperation in hopes of inspiring the microenterprise to engage in collaborating.

It is worth noting that the microenterprise owner classifications of the Microenterprise Classification Module do not mark the microenterprise owners as good or bad. For example, when a microenterprise owner who is classified at the love need level, it does not express that he/she is poorer than a user classified at the self-actualization need level. The reason why we want to classify these users is to recommend an appropriate story framework (composed by the Story Framework Identification Module) for each microenterprise owner. This is analogous to a marketer defining his/her target customers. That is, each level of Maslow's hierarchy of need is assumed to be motivated by some specific story content, and the purpose of
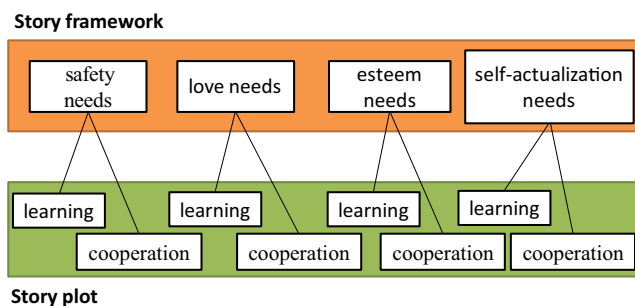
the classification is to generate customized stories to stimulate microenterprise owners at each level.

### 3.2.2 Story framework identification module

To generate customized motivational stories, this module aims to come up with the core content addressing the microenterprises needs and innovation appeals. It then refines the stories generated by the Story Element Suggestion Module. Based on Maslow's hierarchy of needs theory, there can be four types of story frameworks for addressing different needs. In addition, we also take into account the dramatic elements of Dramatica (Phillips and Huntley 2001) and the innovation types (Keeley 1999).

In the theory of Dramatica, the Story of Mind is a unique concept that predicates every complete story as a model of the mind's problem solving process (Phillips and Huntley 2001). According to Dramatica (Phillips and Huntley 2001), there are four classes (including universe, physics, psychology and mind) for classifying problems. In order to increase the precision, each class can further be subdivided into four types (Fig. 8). Each subdivided type focuses on how the characters are represented in different ways. Based on these types, the Story Mind can solve the story's problem.

This study only chooses 10 of the 16 types (including Future, Progress, Present, Understanding, Obtaining, Doing, Learning, Being, Becoming and Conscious) to frame our narrative advertisement story and each type is one state in the FSM. The choices are based on the least number of story elements required to tell a complete encouraging story. This is because advertising-like stories are often concise.

We use the selected types of Dramatica to constitute a story structure in which each type will express a state of probabilistic extended FSM. Following the type of each state which could generate a story paragraph, we choose the next state



**Fig. 7** The categories of the Microenterprise Classification Module



**Fig. 8** The finer classification of Story Mind into 16 types (Phillips and Huntley 2001)

and generate the next story paragraph based on the mechanism of probabilistic extended FSM (Fig. 6(b)).

Because the purpose of our narrative advertisement story is to stimulate our target microenterprises to carry out service innovation, there must be some material concerning service innovation. We adopt the four major types of innovation (Process, Offering, Delivery and Finance) (Keeley 1999) as our additional story material and these innovation types constitute another part of the states of FSM.

With the aforementioned story materials (Dramatica story elements and service innovation types), three-act structure (Field 1979) is adopted to seamlessly integrate the elements into stories. Three-act structure is a very popular story model used in writing. This structure divides a screenplay into a three parts called the exposition, conflict(complication)and resolution. The objective of exposition in the three-act structure has to do with the protagonist's status and the difficulties they encounter. The second screen is conflict; here the protagonist faces more and more difficult obstacles and rising dramatic. The final screen is resolution, concerning how the protagonist finds the solution and makes some change.

Figure 9 is an exemplar plot of our narrative advertisement story juxtaposed with the three-act Structure. In the exposition screen we elaborate the protagonist's current situation, describe how the protagonist's attempt fails, and finally find the point of transition from right to wrong in the conflict screen. Finally, the protagonist finds the correct answers and reaches the story's conclusion in the resolution screen.

Based on the three-act structure, we then set up our states of FSM following the structure and arrive at the story framework shown in Fig. 10. Corresponding probabilistic extended FSMs (PEFSMs) can also be constructed to automate the story generation. According to Fig. 7, each story framework can have four story contents (different content for various job occupations) and the content of each story can have two story plots (learning and cooperating). In other words, each story
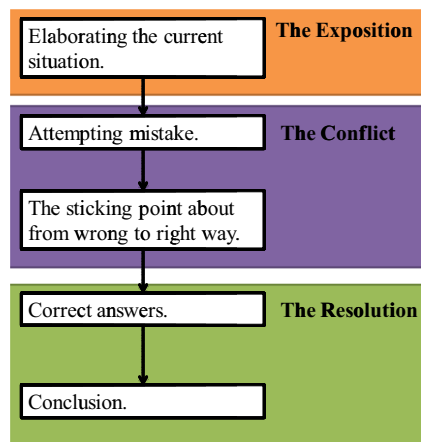
framework can generate eight kinds of different stories, and in total, our automated story generator can generate thirty-two different kinds of stories.

Owing to space limitation, we just explain the story framework for microenterprises classified as having safety needs according to Maslow's hierarchy of need theory. Figure 10(a) is the story framework for these microenterprises. The story circumstances as the five paragraphs are given roughly as follows: First, describe the plight of the protagonist, who is situated in the safety needs state, and then depict the protagonist's consciousness of how a mistake is. Next, the innovation type states represent the turning point at which the protagonist figures out the right idea of how to succeed. The Present state describes the details of how the protagonist fulfills the idea, and then the Being state shows the protagonist's perfect prospects.

We choose Consciousness, Present and Being as the arteries and veins of the safety needs within the story framework. This is because in the beginning state we need to describe the protagonist's feelings about mistakes. The appropriate elements within the 16 types of Dramatica are Understanding, Obtaining and Consciousness. In addition, only Consciousness is classified as a "fixed attitude" among the choices of the 16 types in Dramatica (Fig. 8); the others seem more positive (because of being classified part of the activity in Fig. 8). In other words, we assume that a conservative approach is more suitable for safety needs. Lastly, the Present state expresses the situation after reaching the point of transition (the innovation-type states), and the Being state shows how the protagonist manipulates his business in the future.

In sum, after the execution of the microenterprise Classification Module, our system will decide which PEFSM (embodying a story framework) that the target microenterprises belong to. The Story Framework Identification Module will then generate incomplete story paragraphs. Figure 11(a) then shows an example of the Story Framework Identification Module utilizing the safety needs story framework and learning story plot (i.e., the protagonist's consciousness how the mistake is made. Then, the innovation-type states represent the turning point at which the protagonist figures out the right idea of how to succeed. The Present state describes the details about how the protagonist fulfills the idea, and then the Being state shows protagonist's perfect prospects. The vacancies $E_1$, $E_2$, $E_3$, $E_4$ and A are the uncertain parts of the story paragraph. The Story Element Suggestion Module would fill in these vacancies.

### 3.2.3 Story element suggestion module

The function of the Story Element Suggestion Module is to arrange suitable story elements according to the



**Fig. 9** Narrative advertisement story plot juxtaposed with the three-act structure

(a) The story framework of Safety needs' PEFSM

(b) The story framework of Love needs' PEFSM

(c) The story framework of Esteem needs' PEFSM

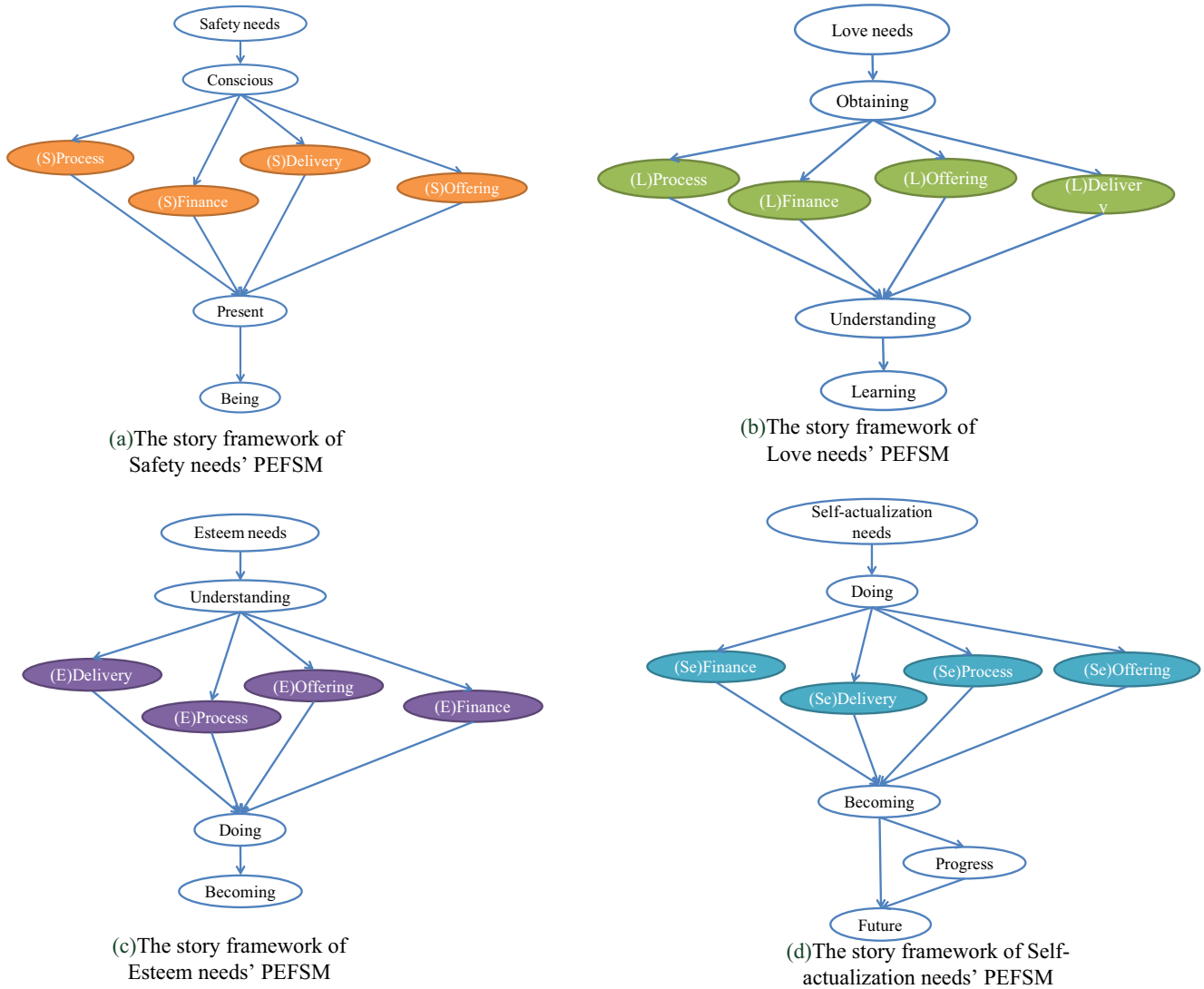(d) The story framework of Self-actualization needs' PEFSM
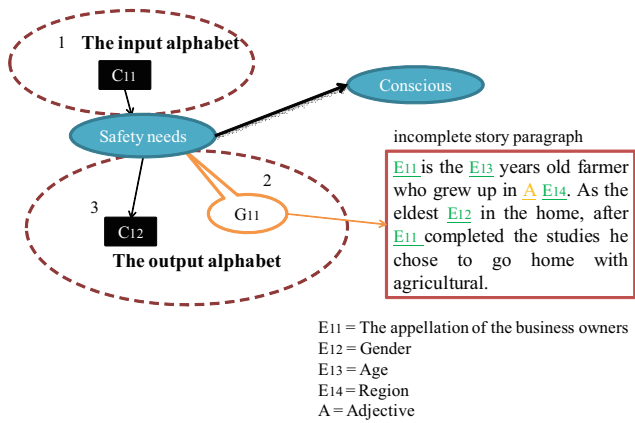
**Fig. 10** Story frameworks

story framework and create a narrative advertisement story which is more vivid and inspiring. These stories are formed by the three parts: the microenterprise personal elements, the system's random element and the adjective database. The main purpose of the Story Element Suggestion Module is to find each microenterprise owner's appropriate elements stored in the microenterprise personal element database.

The microenterprise personal element database is generated by the microenterprise Information Module which gathers the microenterprise owner's information. The purpose of the random element database is to randomly generate the story elements of the protagonist when personal information is not available. The adjective database contains adjectives describing people, the environment and affairs. The purpose of the adjective database is to add an emotional side to the story, based on the microenterprise's local culture, and an inspirational side,

depicting the feeling of the customer after the microenterprise achieves successful innovation.

### 3.2.4 Matching module

The Matching Module is the mechanism bridging between the Story Framework Identification Module and the Story Element Suggestion Module. The major function of the Matching Module is to coordinate the incomplete story framework and the appropriate story elements, which come from the microenterprise personal elements ($E_{ie}$) and the adjective (ADJ) and random elements (D). That is, based on the paragraphs of incomplete stories generated by the Story Framework Identification Module, the Matching Module finds the appropriate story elements from the Story Element Suggestion Module to complete the stories.

(a) An example of the Story Framework Identification Module

E11 = The appellation of the business owners
E12 = Gender
E13 = Age
E14 = Region
A = Adjective
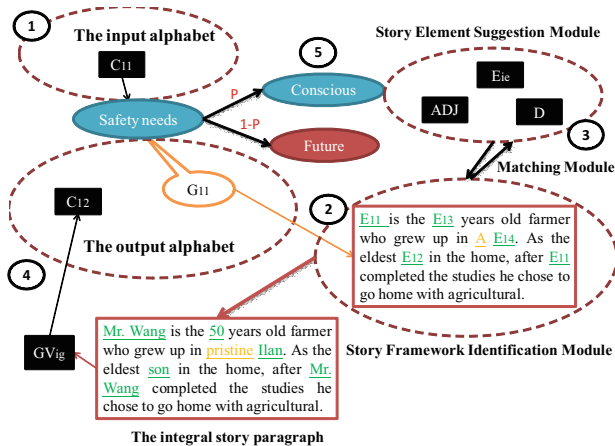
(b) An integral example
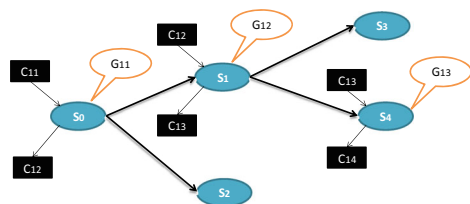
(c) The iterations of the process

**Fig. 11** A demonstrating example about story creation

Figure 11(b) is an integral example in terms of an iteration of a sequence of steps. First, if the context table ($C_{11}$) conforms to the state's (the safety needs state) triggering condition, then it will output an incomplete story paragraph ($G_{11}$) (generated by Story Framework Identification Module). An incomplete story paragraph assembles the appropriate story elements which are generated by the Story Element Suggestion Module through the Matching Module that helps engender an integral paragraph of the whole narrative advertisement story and rewrites the context table as $C_{12}$ when the user selects continuing ($GV_{ig}$) to see the story paragraphs. The iterations would be continued in accord with the story framework as depicted in Fig. 11(c).

# 4 Evaluation

PNAG was a part of an integrated service platform project that involved a team of researchers intending to foster a collaborative and iterative style of work to achieve practical, creative resolution of the problem of goal imagery creation for driving microenterprise business success (Yuan 2011). The purpose of this study is to develop a systematic approach that can automatically generate customized motivational stories in order to inspire microenterprises to engage in service innovation. As mentioned in IS research, the utility, quality, and efficacy of a design artifact must be manifested rigorously via well-completed evaluation methods (Hevner et al. 2004); the observational and analytical methods are two popular evaluation methods. Based on the observation of field study, we use statistics analysis and qualitative interpretation analysis to support our arguments. In the following subsections, we will first depict our propositions that will subsequently be verified. Next, the details of the experiment design will be provided, followed by the presentation of the results of the experiments.

## 4.1 Propositions

The purpose of this study is to construct a mechanism which can recommend appropriate narrative advertisement stories to microenterprise owners, and stimulate them to carry out service innovation. That is, the aim of the narrative advertisement story generator system is to recommend a tailored story frame to each microenterprise owner and generate the customer-made details of story for each microenterprise owner.

Therefore, we will to build a user-needs model used to describe the needs and preferences of different types of users by applying the model of Maslow's hierarchy of needs. Reviewing the mechanism of PNAG's Microenterprise Classification Module, classification is based on the microenterprises' input information, including operating conditions, position in relation to competitors and demand for the innovation. Based on this information, we give each microenterprise a score according to Maslow's hierarchy of needs. Next, we need to verify that this type of classification works. We can then have the following propositions.

- Proposition 1: The PNAG's Microenterprise Classification Module developed based on the model of Maslow's hierarchy of needs could serve as a good user-needs model.
- Proposition 2: The PNAG's recommendation based on the user-needs model of Maslow's needs hierarchy could

motivate microenterprise owners to engage in service innovation.

The above-mentioned propositions from the system's point of view inspect the effectiveness of PNAG. On the other hand, it is necessary to examine the correlation between the similarity of the story and the degree of motivation. This correlation is an important element when someone wants to persuade someone else (Rogers 1962). The proposition for this issue is stated as follows.

- Proposition 3: Microenterprises will have a higher level of motivation when there are more elements related to them in the recommended stories.

### 4.2 Experiment design details

The PNAG mechanism is situated in a big-scale service system that begins with the presentation of customized motivational stories followed by a sequence of stages engaging microenterprise owners in the tasks of designing their service innovation concepts. Since the mechanism involves motivation factors of human psychological which are hard to measure with a computer program, we examine the effectiveness of PNAG through a field study done in the Mt. Pillow Recreational Agriculture Area in Ilan County of Taiwan. Without loss of generality, this study uses the field study to address the aforementioned propositional issues (i.e., performance of the user-needs model, service innovation inspiration engagement, and customized motivation stories).

Mt. Pillow Recreational Agriculture Area, established in 2000, was the first leisure agriculture area in Ilan. The geographical location includes four villages in which Pillow Village is the main planning area. The entire area covers an area of about 78 hectares. The distinguishing feature of Mt. Pillow is its rich natural resources. This area is the largest fruit-producing part of Ilan, including the production of more than 30 kinds of fruits Because the unique natural ecosystems and environmental resources, Mt. Pillow Recreational Agriculture Area has developed rapidly, embracing the various types of recreational farming and B & Bs with different themes providing tourist with colorful experiences of rural life. The recreational farm operators are microenterprises whose human resources and management experience are deficient and incomplete. Thus, they are bound to face many operational problems.

Through interviews and observations, this study aims to understand the microenterprise operators of leisure agriculture and the problems they face in the leisure agriculture business and regional development. The interview process was carried out by the dictation method and the interview content includes two parts; demonstrating the system and collecting the opinions and reactions from the owners. Based on the opinions and reactions conveyed by the owners, we intend to seek out some evidence to support our propositions. Table 3 shows the background of every experimental subject involved in the interviews and Table 4 gives the types of interviews (focus group interviews and in-depth interviews) conducted.

After the field observations, we found that the principal industries of Mt. Pillow Recreational Agriculture Area in Ilan County are recreational farms and bed-and-breakfasts. For the above reason, we chose these two types of businesses as the experimental subjects. In connection with these five experimental subjects we carried out focus group interviews and in-depth interview investigate these microenterprise from a varied of angles.

As follows, we show the design principles and experiment details for every proposition. In addition, we also show the detailed interview questions for each proposition.

#### 4.2.1 Design principles and experiment details for Proposition 1

The objective of Proposition 1 is to make sure the user-needs model classification of our system is effective and can achieve the advertisement's goal. To make the experiment result easy to understand and convincing, we intend verify if the classification used in our system is correct or not. If it is reasonable and feasible to establish the classification of the system based on the microenterprise owners' behavior and information, they will be attracted by the story content. On the other hand, the main idea of this experimental design is to understand the experimental subjects' intention to read advertisements. This will determine whether or not the classification of the system is effective. If the classification is effective, the experimental subjects' intentions to read advertisements will be strengthened.

From this perspective, the most basic evaluation examines the effectiveness of the narrative advertisement story and focuses on internet advertising. Harvey (1997) proposed expanding the ARF model to make it interactive (Fig. 12) by including twelve levels in which three levels (Clickthrough, Interaction, and Attitude Shift) of the twelve levels are regarded as the persuasion stage. Harvey considered that the "clickthrough" is an effective indicator in the persuasion stage.

On the other hand, Novak et al. (1997) pointed out that standardizing the Web measurement process is a critical first step on the path toward the successful commercial development of the Web and proposed two measurement indicators: exposure and interactive indicators. The interactive indicator records the interactive behavior between the user and web pages and measures the effectiveness of advertising.

Based on the above mentioned theories, we divided the story into five sections and used 30 microenterprise owners

**Table 3**  The detailed background of every experimental subject

| Number | Name | Business type | Business content |
|---|---|---|---|
| 1 | Subject 1 | Food Processing Industry; Food and Beverage Industry | The main business is Chinese dessert making new, but attempts to do the transition to the Chinese dessert DIY teaching. |
| 2 | Subject 2 | Bed-and-Breakfast Industry | The business is Bed-and-Breakfast running. The selling points are the beautiful scenery and the night scenes. The other principal occupation is providing vegetables to convenience stores and McDonald's. |
| 3 | Subject 3 | Bed-and-Breakfast Industry | The main business is Bed-and-Breakfast running, and has the garden café constructed based on the ownership's interest of art. The garden café is great but they still continue to improve it. |
| 4 | Subject 4 | Complex-Experienced Leisure Farms | The main business is pear planting, tourist picking fruit experience, tourist teaching of fruit growth process and DIY branches insects teaching. |
| 5 | Subject 5 | Complex-Experienced Leisure Farms | The main business includes kumquat and red guava planting, the tourists picking fruit experience, fruit ice cream DIY and fruit ice cream selling. |

to do the basic test (Figs. 13). After the 30 microenterprise owners finish filling in their basic information, the web page will show their first paragraph of the story. A microenterprise owner can choose if they want to read the next page or not by clicking the "next" or "leave" button and the interactions will be recorded. The starting value is 0. If the microenterprise owner moves on the next section, the value will be plus 1 (the highest score is 5 and the lowest score is 1).

The first system screen displays the questionnaire of the system. After pressing the enter button, the first paragraph of the story will be displayed with two selection buttons which let the microenterprise owner choose whether they want to go on to the next page or leave the system. In addition, the three

click rule proposed by Zeldman (2001) means that a microenterprise owner of a website should be able to find any information with no more than three mouse clicks (otherwise, they will leave the site). On the other hand, Moriarty (1983) considered the effects of advertising to be manifested by education, perception and persuasion. Hence, we select 3 as an effect threshold, which means if the microenterprise owner interacts with the site by clicking more than three times, they think the content is useful for them; this could then be taken as the effect of advertising. In other words, if a microenterprise owner's number of clicks (the score) surpasses 3 we can then say that the advertising is effective. Based on the result, we can deduce whether the microenterprise owner is attracted by

**Table 4**  Interview types

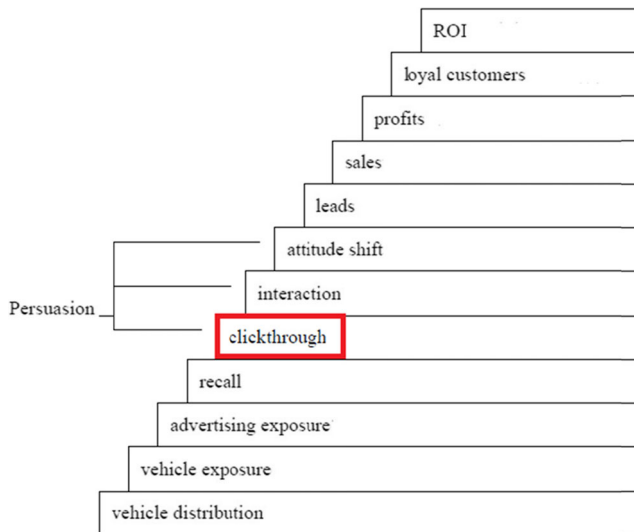|  | Definition | Interview situation | Experimental subject |
|---|---|---|---|
| Focus group interview | Focus group is a form of qualitative research in which a group of people are asked about their perceptions and opinions. The researchers introduce the objective of interview, and encourage the members of the small group to participate in the discussion without the researchers themselves. The shortcoming of the focus-group interview is that the reactions and responses of members might not be independent and it's easily affected by the dominant group members (Henderson and Naomi 2009). | We gathered three experimental subjects to do the focus-group interviews. First, we illustrated the research objective and vision, and then demonstrated the system process and let them to go through the integral system process. After they experienced the system process, we asked some questions and let them discuss. We run several rounds of focus groups each of which involved different group members. | Subject 1 Subject 2 Subject 4 |
| In-depth interview | In-depth interviews are useful when you want detailed information about a person's thoughts and behaviors or want to explore new issues in depth. Interviews are often used to provide context to other data (such as outcome data), offering a more complete picture of what happened in the program and why (Boyce and Neale 2006). | We respectively went to each experimental subject's store to do the deep interviews. The major activity was asking them some questions related to our research objects, and let them provide the in-depth details related to these questions. | Subject 1 Subject 2 Subject 3 Subject 5 Subject 4 |

**Fig. 12** ARF Model Expanded for Interaction (to 12 levels)

**Table 5** The interview questions for Proposition 1

| | Focus group interview | In-depth interview |
|---|---|---|
| Habits and customs | None | 1. How many times do you turn off the page if you have no interest about the contents in your daily reading habit? And describe the situation. |
| | | 2. Do you click the page when the title is not attracting you, and why yes or why not? |
| System related | None | None |

the generated story content, which indirectly means whether the classification is correct. That is, it can indicate whether the using behavior and information to establish the user-needs model based on the model of Maslow's hierarchy of needs is legitimate.

Table 5 then shows the questions for understanding the relationship between using behavior and interest to ensure that the premise of our test is credible (i.e., if the microenterprise owner has inclination to click on web page, then we can say they think the content is useful for them and could say it is effective advertising).

### 4.2.2 Design principles and experiment details for Proposition 2

The aim of Proposition 2 is to test and verify the effectiveness of the advertising by observing microenterprise owners' aspiration toward the innovation stage. This means that we want to connect the experimental subjects' opportunity of innovation and change the advertisement provided by our system. By imitating past experience which has prompted the experimental subject to change their business or daily life, our system creates a new advertisement to stimulate them to carry out service innovation (another new conversion). From another perspective, this is a validation method which speculates whether they will be motivated by the narrative advertisement system or not by observing the past experience of the experimental subject.
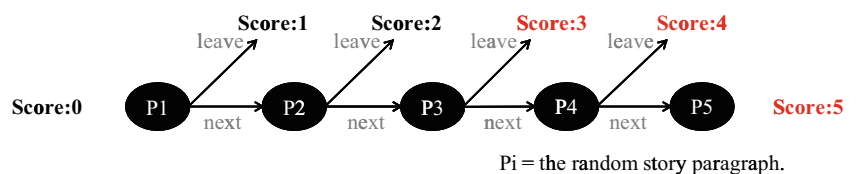
In addition, in this part we carry out some tests of narrative advertisement and inquire about the subjects' willingness to move on to our system's subsequent innovation stages. Through the habits and customs of the experimental subjects and the actual tests of the system, we have developed some interview questions related to the Proposition 2, as shown in Table 6.

The questions related to Proposition 2 aim to understand the experimental subjects' willingness to move on to the innovation stage, and the questions related to habits and customs attempt to connect the daily habits of experimental subjects with the story plot to speculate if the advertising is effective or not (these questions focus on transformative and motivational processes, such as situations that are stimulated by government-offered classes or other trades).

### 4.2.3 Design principles and experiment details for Proposition 3

To examine whether microenterprises have a higher level of motivation when elements within the story are more closely related to their situations, Proposition 3 could be evaluated through observing the reactions of the experimental subjects. The authentication methods of Proposition 2 focus on attitudes toward daily life, but the Proposition 3 interview process unfolds with experimental subjects using the system by themselves and observing the reactions of experimental subjects as they use system. There are two selections in the system process in Proposition 3: personal elements and non-personal elements. Based on what experimental subjects choose to read, inquiries about how they feel about the test are then conducted. After the microenterprise owner determines which

**Fig. 13** The test process with five sections



Pi = the random story paragraph.

**Table 6**   The interview questions for Proposition 2

|  | Focus group interview | In-depth interview |
|---|---|---|
| Habits and customs | None | 1. What's your opportunity to do the transition? |
|  |  | 2. You said that the government conducted some classes to guide you to do transformation. Please describe the classes that ever gave advices about the business transition. |
|  |  | 3. Did you ever reference the operation models of other similar and successful cases? If yes, please describe them? |
|  |  | 4. Did you ever get influenced after you referenced the other examples of operation models? If yes, please describe them. |
|  |  | 5. What's the reason to make you to use the Internet to publicize your business (if any)? |

option they prefer, the system shows a page based on their choice which is recorded to support Proposition 2.

Table 7 shows the interview questions for Proposition 3, which are separated into two parts as is the case for Proposition 2: questions related to the habits and customs of experimental subjects and questions related to the system. In addition to directly asking the experimental subjects which one they like (personal or non-personal), we also look for some daily habits to support Proposition 3, such as reading habits and purchasing habits. The results will be shown in the Section 4.3.

The above questions (Tables 6 and 7) are the main interview questions. These questions were adjusted based on time considerations. To strengthen the validity of the examination, we establish a case study database which stores the interview records and transcripts of the microenterprises in a recreational agriculture area.

### 4.3 Experiments and results

In this part, we will discuss the propositions which are supported by the statistical test and the interview data. Before we begin to discuss the propositions, we delimit the encoding of the interview data first. These data will be used to test and verify the propositions. Data encoding (Saldana 2009) is an interpretive act in qualitative research that symbolically assigns summative, salient, or evocative attributes for a portion of data, which can be further analyzed to attain an in-depth understanding of human behavior or decision-making and the reasons behind it.

The following is the encoding structure we use to interpret the interview data:

"*The responses of the experimental subject*"
*[(Preliminary Codes 1, Preliminary Codes 2 and so on), Final Code]*
[Table number (which enlists the interview questions), Interview type (as introduced in Section 4.2), Question type (as introduced in Section 4.2), the name of the experimental subject].

That is, the *[ ]* area expresses the preliminary codes of the interview note which is the jottings of the raw interview data (providing a transitional link between the raw data and codes) and the final code. On the other hand, the [] area refers to the interview question details related to the interview data shown in the double quotes area. The following section investigates the results of three propositions in three parts.

#### 4.3.1 Experiment and results for Proposition 1

Before the statistical test, we discuss the phenomenon we observed to test and verify the three click rule (Zeldman 2001) from the interview. We found that the three click rule is present in the everyday life of the experimental subjects (as exemplified below).

**Table 7**   The interview questions for Proposition 3

|  | Focus group interview | In-depth interview |
|---|---|---|
| Habits and customs | None | 1. What kind of industry do you want to observe? |
|  |  | 2. Did you particularly pay attention to their industry-related news? |
|  |  | 3. Please describe your attitude about an uncertain situation. |
|  |  | 4. Please describe a selling process situation that you did not accept. |
|  |  | 5. Are you risk aversion or risk seeking? Please give me an example. |
| System related | 1. Why do you want to choose the personal interrelated element story? Or why not? | 2. Which story do you like more, with personal related element or without the personal related element? Why? |

"*If I have no interest in this content when surfing the web, I will quit within two or three pages. On the contrary, supposing this content makes me feel interested, I will read it all no matter how many pages there are.*"
*[(LEAVING WITH NO INTEREST, CONTINUING WITH INTEREST), THREE CLICK RULE]*
[Table 5, In-Depth Interview, Habits and Customs, Subject 2]

Therefore, we know that we can measure the level of interest according to willingness to read and the three click rule (by the coding of *THREE CLICK RULE*).

Next, we examine the effectiveness of our recommendation system by using statistical test. As we mentioned above, we use 30 microenterprise owners to test the system. First, a microenterprise enters their personal information. Based on their input information, we classify them into Maslow's hierarchy of needs. After that, the system recommends a story which suits associated hierarchy of needs' level and customizes the story for the microenterprise. According to the testers' own choice of whether to go on or not, the system records the score. Thus, we hypothesize that, "If a microenterprise owner clicks more than 3 times (the score), the advertising is effective".

Table 8 is the null hypothesis and alternative hypothesis, and based on these two hypotheses we conduct a One-Samples T test. The reason why we choose the One-Samples T test as the method of statistical testing is that it allows for a simple random sample, n (the number of sample)>= 30 and the unknown σ (population standard deviation). In addition, we want to use the sample mean (x bar) to estimate the population mean (μ). This is why we choose a One-Samples T test rather than a Z test. Table 8 shows the hypothesis of the effectiveness of our narrative advertising, which is used to test if the population mean is greater than the score of 3 or not. Furthermore, Table 9 shows the mathematical symbols table which is used to establish the formula later.

To enable calculation, we take advantage of the statistical software SPSS (Statistical Product and Service Solutions) which supports many functions like statistical analysis of computing, data mining, and predictive analysis. As seen in Table 8, $H_0$ as μ<=3 means the advertising is invalid (the population mean score of advertising effectiveness is less than 3) and $H_1$ as μ>3 means the advertising is effective (the population mean score of advertising effectiveness is greater than 3). Table 10 shows the statistical results.

The results of descriptive statistics and the One-Samples T test are shown in Tables 10 and 11. According to the One-Samples T test, the sample mean score is 3.5, the Std. Error is

**Table 8** The proposition testing

$H_0$: μ<=3, this advertising is invalid.

$H_1$: μ >3, this advertising is effective.

μ=population mean.

**Table 9** Mathematical symbols

n = The number of sample.

x bar = Sample mean.

s = Sample standard deviation.

μ = Population mean.

σ = Population standard deviation.

α = Significance level.

p-value = The probability of obtaining a test statistic at least as extreme as the one that was actually observed. On the other hand, it means "the probability of error".

df = Degree of freedom, n−1.

0.243 and s is 1.333. In other words, "If a microenterprise owner clicks more than 3 times (the score), the advertising can be regarded as effective", meaning the proposition has reached a level of significant difference. However, the formula and interpretation of the One-Samples T test must still be considered.

Table 11 is the One-Sample T test consequence which uses the SPSS software with a 95% confidence interval (means α= 0.05) with a null hypothesis and alternative hypothesis.

First, we start with the critical value method. According to Value of $t_\alpha$, we know that t=2.055 and c=$t_{\alpha, n-1}$=$t_{0.05, 29}$ (α=0.05)=2.045 (from Table 12). When t is greater than c, $H_0$ is then rejected which means $H_1$ is established (meaning most of the microenterprise owners click more than 3 times, so the advertising is effective).

Second, from the confidence interval method, a is 3.0024. In Table 11, the lower part of the 95 % confidence interval of the difference is 0.0024 (means ($t_{\alpha, n-1}$ * s/√n) – mean difference (which is 0.5 in Table 11)). Therefore, the ($t_{\alpha, n-1}$ * s/√n)= 0.4976, and a is 3.0024. Because $μ_0$ (3)<= a (3.0024), $H_0$ is then rejected.

Finally, Sig. (1-tailed) in Table 11 is the p-value. The meaning of the p-value is that if α>p-value, then it has reached the level of significance and $H_0$ is rejected. As we mentioned before, when α=0.05 and the p-value=0.0245 (α>p-value), $H_0$ is then rejected.

Therefore, from the One-Sample T test we can understand that $H_0$ is rejected and $H_1$ is accepted. Based on our proposition, we can say that the narrative advertisements which most of the microenterprise owners read are effective. Based on this result, we found that most microenterprise owners want to continue reading for more than 3 sessions, and we can thus say that the user-needs model constructed based on the model of Maslow's hierarchy of needs is a feasible structure for developing a our recommendation system. Moreover, the proposed system's classification of microenterprises based on interactive behavior and microenterprise owner information is reasonable. Because most of the microenterprise owners show interest in the stories recommended by the system, we speculate that the proposed recommendation model is effective.

As follows, we describe the actual interview situation and show the different attitudes toward the five web pages by the

**Table 10** Descriptive statistics

Descriptive statistics

| | N | Minimum | Maximum | Mean | | Std. deviation | Variance |
|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Statistic |
| Value | 30 | 1.00 | 5.00 | 3.5000 | .24330 | 1.33261 | 1.776 |
| Valid N (listwise) | 30 | | | | | | |

experimental subjects. One experimental subject (Subject 2) expressed that she has no interest and wanted to turn off the web pages within three pages. On the contrary, most of experimental subjects indicated that they want to read them (our focus interview groups includes three business owners, and two of them, Subject 1 and Subject 4, indicated that they had a strong desire to read, as shown in Table 4). The reasons why the experimental subjects wanted or did not want to continue reading are discussed in Proposition 3. In this section we understand the behavior of the experimental subjects and test and verify the proposed proposition by using a statistical test. Most of experimental subjects were inclined to continue reading (i.e., our recommendation system is effective), and it is reasonable and feasible to establish a user-needs model based on the model of Maslow's hierarchy of needs to model microenterprise owner behavior and information.

### 4.3.2 Experiment and results for Proposition 2

Proposition 2 investigates the willingness of microenterprise owners to move on to the system's innovation stages. To find this out, we inspect the validity of the advertisement within the narrative. First, we demonstrate the system which automatically generates narrative advertisement stories for the experimental subjects included the focus group interview, and then inquire about the willingness of each these microenterprise owners in the in-depth interview. The follow statements serve as good examples of their responses.

"*Yes, I want to use this instrument if it can improve my business just like the protagonist of the advertisement. But the emphasis is how to use it, while old-fashioned*

people like us have a great obstacle when it comes to using computers.*"
*[(WANT TO USE PNAG, BARRIERS TO COMPUTER USAGE), TECHNOLOGY ACCEPTANCE]*
[Table 6, Focus Group Interview, System Related, Subject 1]
"*If I can get some inspiration without wasting a lot of time, I will use this system. Everyone wants to have good inspiration for their own products, and create some exposure to help their own business. However, the most important thing is that I need some free time to learn; work is very busy. On the other hand, being easy to use is another important thing.*"
*[(EFFICIENCY IS IMPORTANT, WANT TO USE THE SYSTEM, EASY TO USE OR NOT), TECHNOLOGY ACCEPTANCE]*
[Table 7, In-Depth Interview, System Related, Subject 4]

During the interview process, all of the experimental subjects expressed that they would like to use an instrument that can help them find new business prospects, but with a prerequisite that the IT must be easy to use. In order to test and verify this hypothesis, we divided this topic into two parts. First of all, we investigated attitudes towards technology acceptance (by the coding of above data; *TECHNOLOGY ACCEPTANCE*), and then discussed and observed attitudes toward accepting the new things. These two points allowed us better understand the effectiveness of advertising and the acceptance of our system.

From the above interview data we found that it is important that the system be easy to use. On the other hand, whether or the functions are helpful is another factor influencing acceptance of IT. These interview results conform to the

**Table 11** One-sample T test

One-sample T test

| | Test Value=3 | | | | 95 % Confidence interval of the difference | |
|---|---|---|---|---|---|---|
| | t | df | Sig. (1-tailed) | Mean difference | Lower | Upper |
| Value | 2.055 | 29 | .0245 | .50000 | .0024 | .9976 |

**Table 12**   Summary of Proposition 2

| | System related | | Habits and customs |
|---|---|---|---|
| | Perceived ease-of-use | Perceived usefulness | |
| Subject 1 | Expressing that the service system is a bit complicated and need time to learn. However, he express that he is old-fashioned person who has a great obstacle in using computers. | Considering that the system is useful to help them improve their business as the protagonist in the story. | The transformation reason is the case study illustrated in the classes of Recreational Agriculture Area. The success cases serve as a reference of thinking and give them some innovation idea. |
| Subject 2 | None | Considering there is some advantage of the system, it can increase the exposure frequency. | The reason let the owner use the internet advertising is that her neighbor got good performance by using these things. |
| Subject 3 | None | None | He observed other bed-and-breakfast case and got the conversion idea. |
| Subject 4 | Expressing that the most of important is the system process being step by step, it is a motivation to make him have willingness to learn but need time. | Considering that the system is a great idea to tell them how to do service innovation. | He observed the other owner's modus operandi. |
| Final Code | TECHNOLOGY ACCEPTANCE COMMENTARY OF PNAG | | SUCCESSFULPARAGON CASE |

Technology Acceptance Model (TAM) proposed by Davis et al. (1989). TAM is an information system theory that models how users come to accept and use a technology. The Technology Acceptance Model suggests that there are two important factors - perceived usefulness (PU) and perceived ease-of-use (PEOU) - influencing users' decisions about how and when they will use technology when presented with a new technology. Perceived usefulness means the degree to which a person believes that using an unusual system would enhance his/her task performance and the perceived ease-of-use is the degree to which using a particular system would be free from excessive effort. Perceived ease of use is a prerequisite of IT acceptance. Regarding this issue, the following statements exemplify the responses of the experimental subjects.

"*I think the functions of your system are useful, but we need time to understand slowly. By the way, the step by step process of the system is instrumental for learning.* "
[(USEFUL, NEED TIME TO LEARN, THE PROCESS IS GOOD), COMMENTARY OF THE SYSTEM]
[Table 6, In-Depth Interview, System Related, Subject 4]
"*I think the process is complex; otherwise it is a great idea.*"
[(COMPLEX, GREAT IDEA), COMMENTARY OF THE SYSTEM]
[Table 6, Focus Group Interview, System Related, Subject 1]
After we demonstrated the whole system process to the subjects, they agreed that the innovative idea is useful but the degree of difficulty to use the system reduces their willingness of use it (codes as COMMENTARY OF THE SYST

EM). Inspecting our system from the Technology Acceptance Model's point of view, the perceived usefulness is the added value side of using, but the perceived ease-of-use side greatly reduces the intention. Because the motivation part of our system is the main window to persuade microenterprises that the system is easy to use, we must reduce the complexity of the process of interactive advertising in order to enhance the intention.

On the other hand, in order to reduce the complexity of the process and motivate users to use the system, we can examine the daily life attitudes of the experimental subjects to gain more insight when creating the content of the advertisement. In this part (the in-depth interview) we discuss the connection between attitude toward innovation acceptance and the advertising content which we use to persuade microenterprises. In other words, we want to replicate the microenterprises' behavior in relation to accepting new things as a model and juxtapose it with our advertisement content.

"*The reason that prompts me make a transformation is that the case study discussed a recreational agriculture area. They explain some successful cases as a reference to think about what we can do next, and they guide us through some serviceable instruments like the Internet, packages and marketing. Through these successful cases, I think that the transformation and the serviceable instruments are helpful methods for me.*"
[(SUCCESSFUL CASE STUDY, SERVICEABLE INSTRUMENTS FOR BUSINESS, TRANSITION, HELPFUL), SUCCESSFUL PARAGON CASE]

[Table 6, In-Depth Interview, Habits and Customs, Subject 1]

"*The reason why we invested money in Internet marketing like a government homepage, internet advertising and online ordering is that one of my neighbor got good results when using Internet marketing for their business. That's pushing me to do the same thing.*"

*[(COMPETITOR GOT GOOD PERFORMANCE, MOTIVATION FOR USING INTERNET), SUCCESSFUL PARAGON CASE]*

[Table 6, In-Depth Interview, Habits and Customs, Subject 2]

"*We always observe the related industries to find some good things to learn and improve. Last time I was influenced by the Lavender Cottage (a successful garden café in Taiwan), and I want to make some changes to become as successful as them.*"

*[(OBSERVE OTHER RELATED OWNER, LEARN AND IMPROVE, THE MOTIVATION TO CHANGE), SUCCESSFUL PARAGN CASE]*

[Table 6, In-Depth Interview, Habits and Customs, Subject 2]

"*I observed another bed-and-breakfast case; I found that they offer not only lodging but also eating and a place to play. I think it is a great idea; that's the reason that prompted me to make some changes.*"

*[(FOUND IDEA FORM OTHER OWNER, MAKE CHANGE), SUCCESSFUL PARAGON CASE]*

[Table 6, In-Depth Interview, Habits and Customs, Subject 3]

"*I used to be a simple farmer. However, the situation changed for me after I observe the modus operandi of others and had some new ideas about my business' future orientation. Hence, I started a DIY and tour guide business.*"

*[(FOUND IDEA FORM THE OTHER OWNERS, MAKE CHANGE), SUCCESSFUL PARAGON CASE]*

[Table 6, In-Depth Interview, Habits and Customs, Subject 4]

The above conversations have some common features; they all follow a successful paragon case to figure out what else they can do in their business (coded as *SUCCESSFUL PARAGON CASE*). Following the same line of reasoning, contradistinguishing our story from this model is to generate a successful model derived by our system in order to help them engage in service innovation and ameliorate their own business problems. From this perspective, the experimental subjects will be persuaded after reading the advertisement, and they will have more intentions to use our system to help them carry out service innovation. From the Technology Acceptance Model's point of view, the perceived usefulness factor will be strengthened after they read the model advertisement. On the other hand, the other factor of the Technology

Acceptance Model, perceived ease-of-use, is the weakness of our system. For that reason, the urgent priority is to reduce the complexity of the advertising. After solving this problem, the proposed recommendation system would be able to motivate microenterprise owners more effectively.

Table 12 is a summary of Proposition 2, and we find some uncertain attitudes in relation to perceived ease-of-use, such as being too busy and having a great obstacle when it comes to using computers (codes as TECHNOLOGY ACCEPTANCE). However, there are some positive responses as well. One of the experimental subjects said that the system's process is carried out step by step, which they found appealing (codes as COMMENTARY OF THE SYSTEM). On the other hand, from the viewpoint perceived usefulness, almost every experimental subject expressed that the functions of the system shown in the advertisement are great. Moreover, excluding the computer problem, they expressed willingness to use it (codes as TECHNOLOGY ACCEPTANCE). Finally, the last part discusses the habits and customs of the experimental subject and reveals that their innovation patterns or conversion patterns follow a successful model (coded as SUCCESSFULL PARAGON CASE). This is what the narrative advertisement of the system does: create a successful model and a successful protagonist relevant to the microenterprise owner (we will discuss more in relation to Proposition 3). Integrating the above arguments, daily behavior and microenterprise owner response after reading the advertisement show that our narrative advertisements are useful.

### 4.3.3 Experiment and results for Proposition 3

To investigate if the advertising content involving personal elements (e.g., name, age, background, industry and so on) will persuade microenterprise owners more, we construct a framework to create customized advertising by creating a personal protagonist. In order to gain further comprehension, we showed the beta version system to the microenterprises and let them make a choice; with or without a personal protagonist. From the interviews, we received two distinct reactions. The following statements exemplify the responses based on these two choices:

(1)  Do not choose a story with personal protagonist:

"*I think this is strange to read a story with someone with my name, background and so no, but not hundred percent similar with myself. There is still some information not really similar with me and I may not do this decision-making like the protagonist. It is more attractive if the story is on the premise that any other person is the protagonist. Then I will continue reading.*"

*[(STRANGE, NOT ONE-HUNDRED PERCENT SIMILAR), THE REASON: N]*
(THE REASON: N expresses the reason why the choice of the experimental subject is no.)
[Table 7, Focus Group Interview, System Related, Subject 2]
*"I think I am a person who is conservative, so I don't like to determine my own destiny right away. For that reason, I like to reference many other peoples' stories to improve myself slowly instead of solving a problem quickly based on one simple guideline story. I don't like uncertain situations."*
*[(CONSERVATIVE, NEED TO DEEPLY EVALUATE, REJECTS UNCERTAIN SITUATIONS), THE REASON: N]*
[Table 8, In-Depth Interview, System Related, Subject 2]
The above experimental subject felt that she did not want to put herself into an uncertain situation (from the above two dialogues) (by the coding of *THE REASON: N*); in other words, she does not like to take risks in her daily life. It seems the consequence of interview stand against Proposition 3. That is when the background of the story protagonist is similar with that of the persuaded person, he/she will be more easily persuaded. However, we can analyze the psychological state of the experimental subject more deeply in the above dialogue. The reason why the experimental subject does not want to take a risk even after reading a story is that he/she does not want to read about anything negative happening to him/her.

*"I am a person who is conservative and don't like to take risks. I am afraid that a big change will make me fail."*
*[(CONSERVATIVE, HATES RISK), THE REASON: N]*
[Table 7, In-Depth Interview, System Related, Subject 2]
This ratiocination is in accord with the view of positive psychology we mentioned above - positive emotions can expand people's awareness and encourage innovation, but negative emotions lead to narrow survivalist behavior (Seligman and Csikszentmihalyi 2000). People will evade any negative information about themselves, and the experimental subject does not want take the risk of seeing something uncertain and she is afraid of the possibility of reading a negative story about herself. Therefore, the factors which could affect Proposition 3 are not only the relevant story elements but also the level of risk acceptance.

(2)   Want to choose a personal protagonist:

*"I prefer to understand how much I can change. Another person's story will not necessarily motivate me."*
*[(OTHERS HAVE NO MOTIVATION), THE REASON: Y]*
(THE REASON: Y expresses the reason why the choice of the experimental subject is yes.)

[Table 7, Focus Group Interview, System Related, Subject 1]
*"First of all I want to comprehend other person's story as my reference, but I still need to read the story from my own point of view to find out what this product can do to improve my business."*
*[(OTHER'S STORY AS A REFERENCE, NEED TO GET DIRECTION FROM A RELATIONAL STORY), THE REASON: Y]*
[Table 7, In-Depth Interview, System Related, Subject 4]
The above experimental subjects (Subject 1 and Subject 4) clearly indicated that they want to choose a story written from their point of view in order to comprehend what else they can do (codes as *THE REASON: Y*). Even if there is uncertainty and something in the future happens to the protagonist which is a negative portrayal of the experimental subjects, they still want to take a risk. As mentioned above, the factors which could affect Proposition 3 are not only the relational story elements but also the level of risk acceptance. As follows, we discuss what factors could affect the level of risk accepted.

The above two distinct attitudes towards risk manifested by the experimental subjects have compelled us to take a deeper look at the backgrounds of these experimental subjects. We found that the experimental subjects who are more willing to take a risk in planning future are less satisfied with their current life compared with those with low willingness.

*"Instead of depending on running the Bed and Breakfast for a living, I am just seeking the happiness. I am a person who pursues a stable life and not a risky one."*
*[(NOT FOR MAKING A LIVING, SEEKING HAPPINESS, STABLE LIFE), ATTITUDE]*
[Table 7, In-Depth Interview, Habits and Customs, Subject 2]
The principal occupation of this experimental subject (Subject 2) is providing vegetables to convenience stores and McDonald's, and the income from the Bed and Breakfast is dispensable (Table 3). On the other hand, they said that they do travel abroad during their free time. Compared with the other two experimental subjects (Subject 4 and Subject 1), the living standard of the above experimental subject is better than that of the others (coded as *ATTITUDE*). At the same time, we can learn from the following dialogue that the other two experimental subjects (Subject 4 and Subject 1) have more willingness to take risk.

*"If there is some idea which could help me make a transition, I am willing to take a risk to do this even if there are hazards."*
*[(WILLING TO TAKE RISK), ATTITUDE]*
[Table 7, In-Depth Interview, System Related, Subject 4 and Subject 1]

On the other hand, the following statement is an early period in-depth interview with Subject 5. The aim of this early period in-depth interview was to understand the actual local demand and one of the experimental subjects (Subject 5) expressed that the life of a Bed and Breakfast owner is better than that of a agriculturist:

> "*The operating conditions of Bed and Breakfasts are relatively prosperous in Mt. Pillow Recreational Agriculture Area in Ilan County.*"
> [(B & B IS WEALTHY), CIRCUMSTANCES]
> [In-Depth Interview, Understand the demand, Subject 5]

Based on the prospect theory proposed by Kahneman and Tversky (1979), people make decisions based on the potential value of losses and gains rather than the final outcome, and people evaluate these losses and gains by using interesting heuristics which violate the expected utility theory of traditional economics. There are many applications extended from the prospect theory, such as reversing of risk aversion/risk seeking in cases of gains or losses (termed the reflection effect) (Tversky and Kahneman 1981). According to this study, the preferences of gain and loss are asymmetric to humans. Individuals have risk seeking tendencies if they are in the loss condition, and more risk aversion tendencies when they are in the profit condition.

The prospect theory has rapidly been extended to other domains. Many scholars have used prospect theory to explain the decision-making of voters in elections, and have found that different contexts may lead to different election results. In general, when people feel optimistic about a country's economy, they will be inclined toward the status quo. In order to ensure the status quo, people usually choose a more conservative ruler or policy. On the contrary, when the economic is in recession or facing a major threat, people tend to gamble and accept bold or radical policies and candidates.

Furthermore, if someone lives in a more affluent environment, they will tend to be content with things as they are. On the other hand, if someone lives in a more difficult environment, they will be more willing to take risks.

Connecting the above theory with the observations of the interview data, the two responses of the experimental subjects seem quite reasonable. The experimental subjects who do not want to see anything uncertain happen to him/her in the future are more affluent. Or we can say he/she is more satisfied with the current status. Inversely, the experimental subjects who have intensive willingness to take risk are more dissatisfied with the status quo.

In order to exclude the level of risk acceptance from Proposition 3, we inquire about the experimental subjects' habits and customs.

> "*I am usually concerned with relevant industry news from television program, newspaper and books.*"
> [(RELEVANT INDUSTRY), RELEVANT INFORMATION ACCEPTANCE]
> [Table 7, In-Depth Interview, Habits and Customs, Subject 1]
> "*Compared with the foreign programs, I enjoy native Taiwanese serial drama regardless of whether the characters in foreign programs are Chinese or not. For example, I love to watch travel programs to find some inspiration for my business, but I am still most interested in Taiwan.*"
> [(NATIVE TAIWANESE SERIAL DRAMA, TAIWAN REGION), RELEVANT INFORMATION ACCEPTANCE]
> [Table 7, In-Depth Interview, Habits and Customs, Subject 2]
> "*Once, a salesman wanted to sell us a food package which did not conform to the local culture; consequently, I did not accept it.*"

**Table 13** Summary of Proposition 3

| | Choose the personal like protagonist one or not | Risk | | Habits and customs |
| | | Risk aversion | Risk seeking | |
|---|---|---|---|---|
| Subject 1 | yes | | v | He usually concerns the relevant industry news from television program, newspaper and books. |
| Subject 2 | no | v | | She likes Taiwan native serial drama no matter the character of foreign programs is Chinese or not. |
| Subject 3 | None | | | She won't choose the food package which doesn't conform to the local culture. |
| Subject 4 | yes | | v | He likes the farmers' visiting group which visit the related industries instead of the completely irrelevant ones. |
| Final Code | THE REASON:N<br>THE REASON:Y | ATTITUDE<br>CIRCUMSTANCES | | RELEVANT INFORMATION ACCEPTANCE |

*[(DOES NOT ACCEPT AN UN-CONFORMING CUL-TURAL PRODUCT), RELEVANT INFORMATION ACCEPTANCE]*

[Table 7, In-Depth Interview, Habits and Customs, Subject 3]

"*We usually hold the farmers' visiting group to learn operation skills. These visitors are more interesting in visiting the related industries. I can find some useful recommendations and suggestions from other owners from related industries.*"

*[(RELATED INDUSTRIES), RELEVANT INFORMA-TION ACCEPTANCE]*

[Table 7, In-Depth Interview, Habits and Customs, Subject 4]

From the above dialogue we can understand that humans are easily attracted and influenced by analogous culture, industries and backgrounds (coded as *RELEVANT INFORMATION ACCEPTANCE*). This corresponds with Proposition 3; the persuaded microenterprise owners are more likely to receive the new things and accept new products. In conclusion, excluding the level of risk acceptance, microenterprises will have more incentive when there are more elements in the story related to them.

Table 13 a summary of the Proposition 3. We can notice that the attitude towards risk is related to the choice (the experiment subjects who choose a personal protagonist have the tendency toward risk seeking and vice versa) (coded as THE REASON: N, THE REASON: Y, and ATTITUDE) and we can get some endorsement from the experimental subjects' habits and customs (coded RELEVANT INFORMATION ACCEPTANCE).

# 5 Conclusion

Although story generator systems are still at an early stage of development on producing the depth and richness of narratives, this paper presents a customized narrative advertisement story generator system to persuade microenterprises to engage in service innovation. This persuasion takes into account different contextual/individual factors (needs, experiences, innovation types) and the storied nature of human conduct, manifesting as advertisement stimuli through stories. To this end, our PNAG methodology combines Maslow's hierarchy of needs model, Dramatica story structures, the three-act story framework and probabilistic extended FSMs embodying the aforementioned persuasion elements. Our information system seeks to predict the motivating stimulus in the form of narrative advertisement stories that microenterprise owners have not yet considered. This advances the existing story-generation approaches (i.e., simple rule-based or template-based) in terms of flexibility and dynamism on motivating story customization.

Our preliminary findings show that our system could encourage microenterprises to get motivated about service innovation based on the user-needs model construction according

to the model of Maslow's hierarchy of needs. Moreover, microenterprises would have more incentives when there are more personally related elements in the story. In addition, microenterprise owners who are not satisfied with life now are more likely to be attracted by our narrative advertisements, because they are willing to assume risk. However, the computer barrier to entry is an influencing factor that would affect the willingness of using the system.

The attempted contributions of PNAG include (1) presenting a novel application of using automated narrative advertisement generation for persuading microenterprises to do service innovation using mini customized motivational stories; (2) featuring flexibility and dynamism in constructing mini stories with customized user experience in comparison with existing story generators based on a fixed limited set of story elements. We believe that the PNAG methodology can inspire future research of persuasive narrative advertisements, automated story generation systems in terms of new models or new applications.

There are some limitations in PNAG which need to be improved upon, such as strengthening the level of customization in integrating user related story elements and incomplete story frameworks, extending PNAG's application to more fields of study related to persuasion and service innovation, advancing technical persuasion mechanisms for any function or purpose, etc. Our future work accordingly will put our system into more field studies and gather some further qualitative and quantitative field feedback regarding the usefulness and the performance of our customized narrative advertisement story system.

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