

1 **Designing a Dynamic Model of Brand Value-Creation for Sports Clubs**

2 **Hosseini Helen¹, Bahrololoum Hassan^{2*}, Andam Reza³, Hasani Aliakbar⁴, Bagheri Hadi⁵**

- 3 1. Department of Physical Education and Sport Science, Faculty of Physical Education, Shahrood University
4 of Technology, Shahrood, Iran
- 5 2. Department of Physical Education and Sport Science, Faculty of Physical Education, Shahrood University
6 of Technology, Shahrood, Iran (corresponding author)
- 7 3. Department of Physical Education and Sport Science, Faculty of Physical Education, Shahrood University
8 of Technology, Shahrood, Iran
- 9 4. Department of Industrial Engineering, Faculty of Industrial Engineering and Management, Shahrood
10 University of Technology, Shahrood, Iran
- 11 5. Department of Physical Education and Sport Science, Faculty of Physical Education, Shahrood University
12 of Technology, Shahrood, Iran

13 **Abstract**

14 **Purpose:** The purpose of the current research is to design a holistic model for brand value-
15 creation in sports clubs in Iran. The system dynamics approach has been chosen for the analysis
16 of brand value creation due to the presence of various factors and complex interactions and
17 feedback in time.

18 **Design:** An integrated dynamic model for brand value-creation of volleyball clubs is developed
19 which incorporates brand equity, financial, physical, social, and human capital, competition
20 environment, laws, social responsibility, brand communications, and club stakeholders including
21 the federation, sponsors, shareholders, and fans variables. The system's boundaries, variables,
22 and their interactions were assessed using reviews and expert opinions. The proposed dynamic
23 model was validated by using a set of strategies. Ranking strategies' outcomes are simulated and
24 analyzed using hybrid multi-criteria decision-making.

¹ . +989155618176; helen.sp57@gmail.com

^{2*} . +989196698227; bahrololoum@shahroodut.ac.ir

³ . +989113371420; reza.andam@gmail.com

⁴ . +989126730683; aa.hasani@shahroodut.ac.ir

⁵ . +989129458293; bagherihadi25@yahoo.com

25 **Findings:** The obtained results indicate that human resources especially star players and active
26 participation in online brand communities have had the most effect on the value-creation of the
27 club's brand.

28 **Originality:** This study is one of the first research that investigated the complex relationships
29 between sports club brand value creation variables by using the system dynamics.

30 **Keywords:** Brand Equity, Sports Clubs, Stakeholders, Analysis of System Dynamics, Multi-
31 Criteria Decision-Making

32 **1. Introduction**

33 The main pursuits of business are creating value gaining a competitive advantage and improving
34 the company's performance [1]. Sports clubs have been able to use opportunities provided by
35 their brand value-creation and earn various business advantages, especially in the sports industry
36 during the past few years [2, 3]. The support of sports clubs by society in terms of financial and
37 final success shows the importance of brand value in the sports industry [4]. A sports club is only
38 respected and supported when it provides appropriate value for its stakeholders [3].

39 Club branding increases interest and attraction in stakeholders during the first year of an
40 organizational life [5]. It can guarantee the satisfaction and loyalty of stakeholders in the later
41 years of the clubs' life cycle [6]. Thus, the chain of activities and processes must start with the
42 needs and demands of stakeholders, and it must end with their satisfaction [7]. Some of the
43 important stakeholders of a club include fans, shareholders, sponsors, the club's employees
44 (office workers, players, etc.), support organizations, and governing bodies (federation and the
45 league) [8]. A club can build strong stakeholder relations through its brand. Thus, it can predict,
46 identify, analyze, and solve probable problems that might arise for its stakeholders [9-10].

47 Sports clubs' brand value-creation is vital in terms of attracting more financial supporters and
48 increasing stock value [2]. A club's brand value-creation is based on the effects of value-based
49 management, and provides for the achievement of final success in terms of professional,
50 financial, and social aspects [11-13]. Therefore, the establishment of the philosophy for clubs is
51 based on value-creation plus the definition of value as related to the stakeholders. Proper
52 strategies must be adopted in new competitive environments to maintain and expand the club's
53 competitive advantages [14-15].

54 Brand value impacts an organization's operations over time as a multi-dimensional problem.
55 The complex relationships between the value-creating variables and feedback with some time
56 delay make a static analysis of brand value-creation highly limited. Thus, developing a dynamic
57 brand value model offers an effective analysis tool. Due to various factors influencing brand
58 value, organizations like sports clubs need tailored models for decision-making environments.
59 This study presents a Comprehensive model for Iran's volleyball super league clubs, focusing on
60 factors affecting brand value. Identifying the components and finding the relationships between
61 them and their impact on each other, due to the behavior of these effects over time, and using the
62 system dynamics method can increase the efficiency of decisions and ultimately the success of
63 sports clubs.

64 **2. Literature review**

65 In this section, conducted studies are reviewed in aspects of two main streams including
66 general brand value-creation and sports brand value-creation.

67 **2.1. Brand value-creation**

68 Value creation has emerged as a central marketing theme [16]. Various factors such as human
69 capital can affect the brand value-creation. Evaluation of the role of human capital in the value-
70 creation process shows that we need proper material economic development to make proper use
71 of highly proficient human capital which can be deduced from the value of fixed assets plus
72 consumable assets [17]. Value-creation is influenced by human resource management, and
73 moreover, managing the engines of value-creation implies that there is no economy without
74 value-creation [18].

75 Customers and employees are two important groups that affect value-creation. Value co-
76 creation occurs when the supplier-consumer interaction is the basis for the consumer's positive
77 perception of the value of the marketing offer [19]. Create value by expanding customer values,
78 investing in learning, development, and pursuing control-based work design in human resources
79 management [20]. The ability to provide services that create strong interaction and make up a
80 leeway creates more value than anything else for the customers [21]. Direct or indirect
81 participation of customers can affect an organization's value-creation [22]. Customer interest has
82 a positive effect on the economic, social, and affection of focal customers (or value-creation for
83 customers by customers) [23]. Moreover, Fostering a secure, empowered, and valued work
84 environment motivates employees to achieve organizational goals. This process will strengthen
85 value-creation in the daily routine work of the employees [24].

86 Alternatively, the most important assets of any business are intangible; David Acker believes that
87 these assets, i.e. name, brand, associations, symbols and slogans, perceived quality, brand
88 awareness, brand image, brand loyalty, customer base, and so on, which constitute the brand
89 equity, and are the main sources of the company's competitive advantage and future revenue

90 [25]. Jones (2005) considers brand equity as a basis for creating brand value. In addition, the
91 brand equity components have effects on each other that will be important in creating value.
92 Some of the reported research results indicate that brand loyalty relies on brand experience and
93 trust. [26]. Brand image and brand loyalty affect customer satisfaction and brand awareness [27].
94 Online brand communities serve as an introduction to the creation of the brand image in the
95 minds of customers and considerably help proper brand association [28].
96 Furthermore, The studies demonstrate that organization activities like social responsibility and
97 stakeholder relationships contribute to value-creation. Observable social responsibility of an
98 organization such as environmental and social participation has a positive effect on the products'
99 market and products' quality [29].
100 Researchers presented a future-focused model for value-creation. Then, a transition path is
101 designed and the specific actions to be taken including expansion of capabilities through
102 investment in social, natural, mental, financial and production make it possible to obtain its long-
103 term value [30].

104 **2.2. Sports brand value-creation**

105 The effect of human, physical, financial, and social capital is have great importance in value-
106 creation [31]. The results obtained from studying value-creation and sports management with
107 emphasis on various intrinsic dimensions of sports-related business including historical,
108 economic, and social indicate sports clubs would have economic activities beyond selling
109 seasonal tickets, commercial products, and TV broadcasting rights. On the other hand, if the
110 main duty of jobs is attracting and keeping customers, then the function of sports-related jobs is
111 harder due to the various dimensions of sports. Therefore, the value-creation model design is
112 crucial for a sports club's stability and success. Analysis of relationships between the structure

113 and functioning of different sports-related organizations with emphasis on value-creation and the
114 concept of the circle of nobilities (implying releasing a chain of positive reactions) shows how
115 structures can make the best use of value-creation. Although both Real Madrid and Barcelona
116 clubs do not have any value-creation models for themselves, they are amongst the clubs with the
117 highest revenues [32].

118 Other factors identified for the study of value-creation in sports and business activities include
119 brands and financial support as value-creation, the value of social responsibility in sports, and
120 sports as a network [13].

121 Moreover, a club's brand equity is crucial in value-creation. Factors such as experience,
122 management, success, head coach, stadium, star players, and logo play important roles in its
123 development. Brand equity is affected by variables of brand loyalty and financial support [33].
124 Hereby, the team's success, star players, and skilled technical team enhance the brand's
125 attractiveness and image. [34].

126 Fans and social media can be of high importance in a club brand's value creation. Fans can
127 serve three roles as attractors, adapters, and acknowledgers in value creation [35]. Social media
128 is an effective channel for implementing value-creation strategies aligned with fan interests [36].

129 Despite the importance of brand value-creation, there has been very little attention paid to this
130 issue in Iran's sports clubs. Previous studies had limited stakeholder coverage, primarily
131 emphasizing customers and shareholders. Moreover, even though value-creation in time happens
132 in financial and non-financial ways, previously reported studies mainly considered the financial
133 dimensions. Therefore, there can be a competitive advantage for the clubs if we can identify the
134 factors involved in brand value-creation in sports clubs such as to satisfy all stakeholders in the
135 simplest and most realistic ways. We can align club behavior with stakeholder needs, identifying

136 and interacting with them to ensure satisfaction. Brand value-creation can have an important
137 effect on the robustness and financial success of the sports club. Finally, the main contribution of
138 this study is to develop a comprehensive hybrid dynamic model with MCDM methods for
139 analyzing brand value-creation incorporating extensive variables such as brand equity, club's
140 capital, competition environment, federation authority, sponsors, club profit, club stock value,
141 fans' team identity, number of fans, and social responsibility.

142 **3. The proposed dynamic model: sports club brand's value-creation**

143 Next, we will describe the developed model for analysis of brand value-creation based on
144 literature review and experts' opinions. For this purpose, the multi-stage analysis method of
145 system dynamics modeling has been used [37-39] (see Figure 1).

146 Variables and their relationships were identified based on a literature review. Then, the findings
147 have been confirmed by experts (confirmation of the presence/absence of variables and their
148 relationships, introducing new variables and new relationships in causal loops). As a result, The
149 development of causal loops is based on literature and expert opinions. For this purpose, fifteen
150 experts (including three club CEOs, four club marketing managers, and eight sports brand
151 researchers) were interviewed. Of these fifteen experts, two of them were women and thirteen of
152 them were men. The education of nine of them was doctorate in sports management. Four people
153 were senior experts in marketing management and financial management. Two people were
154 masters in physical education and two people were bachelors in physical education. Brand value-
155 creation of a sports club consists of several key factors including brand equity, club's capital, and
156 club stakeholders. In this way, the club's capital includes financial, physical, social, and human,
157 competition environment, club rules, social responsibility, and brand communications, and the

158 club's stakeholders include the sports federation, sponsors, shareholders, club's employees
159 (employees, players, and others) and fans. These factors will be detailed below.

- 160 • Brand equity includes factors such as brand loyalty, brand awareness, brand association,
161 and perceived brand quality and it is affected by social responsibility. It also affects the
162 competition environment.
- 163 • Club's capital consists of social capital, financial capital, human capital, and physical
164 capital. This will also affect the competition environment. Moreover, human capital will
165 affect brand communications, brand associations, and costs. It is affected by brand value-
166 creation as one of the stakeholders.
- 167 • The competition environment is affected by various factors such as the club's fame,
168 social responsibility, innovation level, federation, brand equity, brand communications,
169 and the club's capital. Conversely, brand communication is affected by marketing efforts,
170 human capital, satisfaction, and trust of stakeholders. It can also affect other factors such
171 as the competition environment, and brand equity.
- 172 • Federation is a factor that is affected by the club brand's value-creation while as a group
173 of stakeholders; it affects the competition environment and laws of the club.
- 174 • Sponsors are a group of stakeholders who can affect sources of club income.
- 175 • The final profit for the club is obtained from the subtraction of costs from income.
- 176 • The value of stocks of the club which is an important factor for shareholders affects the
177 financial capital of the club.
- 178 • Fans' team identity is affected by brand associations and the club's fame, and it can affect
179 brand loyalty and social capital.

- 180 • The number of fans is affected by the club's fame, social responsibility, and branding and
181 it affects social capital.
- 182 • Social responsibility affects the club brand's value-creation, brand equity, number of
183 fans, club's fame, and competition environment.

184 Figure 2 illustrates cause-effect feedback with system dynamics analysis. Diagrams are strong
185 tools to model dynamic assumptions presented in cause-effect diagrams which show how the
186 variables of the system dynamics interact with each other. The formation of cause and effect
187 loops in the model shows the relationships between the variables. For instance, the successive
188 effects of sports club brand value-creation on the support of financial sponsors, financial sponsor
189 support on profit, and the profit on the value-creation of the sports club brand form a
190 reinforcement causal loop in the proposed model. In addition, the sequential effects of sports
191 club brand value creation on the federation, the influence of the federation on club rules, and
192 club rules on the brand value creation of the sports club show another reinforcement causal loop
193 in the brand value-creation model. Further reinforcement causal loop could be defined via
194 potential relationships between the effects of club brand value-creation on the number of fans,
195 the number of fans on social capital, social capital on funds, and finally the effect of funds on the
196 value-creation of the sports club brand.

197 Diagrams include the set of state variables as well as transition rates. State variables indicate
198 conditions of the system at any specific time. In this study, the variables club brand's value-
199 creation, brand equity [40], perceived brand quality, brand awareness, brand loyalty, brand
200 associations [27, 33], club reputation, capital, social capital, human capital [17, 31], operations
201 cost and benefit [31] are assumed to be state variables. The rates or flows are time-dependent and
202 may not be defined if time is assumed to be constant. State variables are changed by flow rate

203 variables. Moreover, in this study, social responsibility [29], marketing mix [41-42], marketing
204 efforts, internal branding [6, 31], trust [26], fans' team identity, number of fans, number of
205 volunteers, shareholder stock value [43], management experience, players' experience, coach
206 experience, employees experience [31, 33], satisfaction [6, 7], brand communications [36],
207 club's laws, competition environment, competition day income, income from commercial
208 activities, donations, and media broadcast charges [31, 44] are assumed to be rate variables.

209 **4. Research findings**

210 Data in this research are analyzed in this section by using hybrid system dynamics and multi-
211 criteria decision-making methods. Figure 3 shows considered relationships between the various
212 parts of a club's brand value-creation model. Vensim software package was used for the
213 simulation of the described model. The simulation duration is set to 15 years. The duration of
214 this period was considered from 2016 to 2031.

215 Since all the results were based on a case study (Iran Volleyball Super League), the title of the
216 case study is presented in the findings section.

217 **4.1. Case study profile**

218 Iran Volleyball Super League is a professional league with the highest level of competition
219 among volleyball clubs. This league is organized by the Volleyball Federation of Iran. In 2013,
220 Iran won the quota for participating in the World Volleyball League. Since then, the popularity
221 of volleyball in Iran has multiplied and more fans have been attracted to this sport. Before
222 entering the World League, Super League Volleyball competitions were held in Iran with about 8
223 to 11 teams. After entering the World League, this number increased to 14 teams. Almost all of

224 these teams are run by the public sector. About 3 teams are managed by municipalities and 8
225 teams are managed by companies affiliated with the Ministry of Industry and Mines of Iran.

226 The main cost of the clubs is related to human resources, which has been in the range of 10 to
227 20 billion Rials for one year .The most important source of income for clubs, according to the
228 approved laws, can be from the place of media broadcasting rights. The share of other sources of
229 income such as sponsors, match day income, donations (government, donors, and fans), and
230 other sources has been limited due to improper branding of clubs over the past years. However,
231 by improving branding and attracting more revenue from these resources, the revenue conditions
232 of the clubs can be significantly improved. For this purpose, a dynamic integrated model
233 including dimensions such as brand equity, club's capital including financial, physical, social,
234 and human, Competition environment, club rules, social responsibility, brand communications,
235 and club stakeholders including sports federation, sponsors, shareholders, club employees
236 (employee, players, and others) and fans has been developed to analyze the brand value creation
237 of sports clubs in the Iranian Volleyball Super League.

238 **4.2. Model validation results**

239 Model validation is done with the objective of analysis of the reliability and applicability of
240 the results. Structural and behavioral validation is considered for this purpose. At first, the
241 structural validity was approved by experts' opinion. Then, bounds and parts testing methods
242 were used for behavioral validation. In the bounds test, several variables of the model such as
243 employee experience were set at their bound values (very high and very low) and the sensitivity
244 of the model to these changes was studied. The obtained results indicate a logical behavior of the
245 model at the bounds under study. Then, model parts were tested. The model was broken down

246 into simpler sub-models and the extreme bounds tests were done on each sub-model (Figure 4).
247 All results obtained indicate the desirable behavioral validity of the model.

248 **4.3. Simulation results**

249 Validation measures for the developed dynamic model were chosen based on experts'
250 opinions. Therefore, simulations of the present conditions were done for 15 years starting from
251 2016 (current conditions) as shown in Fig. 5. The key effective variables used were club brand
252 value-creation, brand equity, brand loyalty, perceived brand quality, brand associations, capital,
253 number of fans, support of financial supporters, level of innovations, and federation. The
254 obtained results indicate improvement of key variables in the 15 years of simulations.

255 This growth is due to the present conditions of Iran's volleyball Super League concerning value-
256 creation via brands that are in inappropriate and underdeveloped conditions. Conversely, after
257 developing the model and analysis of operations for 15 years, we can see that the evaluation
258 measures (i.e., key variables) have a desirable growth (see Figure 6). One of the reasons for this
259 claim is that the feedback from the club's human capital including star players, experienced
260 executive and technical teams, attention to social responsibility, and the club's financial capital.
261 Moreover, possible feedback from special attention to income sources such as TV broadcast rights
262 and financial supporters, internal branding and other factors that affect value-creation will play a
263 role in this growth. In addition, the increases in possible positive roles of feedback loops that
264 exist in the model (such as the club's brand value-creation, number of fans, social capital, and
265 capital) show the reason for growth. Providing a variety of income sources such as TV broadcast
266 rights, employing star payers, presence of professional technical-office teams, fan loyalty,
267 achieving desirable results in sports competitions arranged by the club, and the pursuing
268 attraction of more financial support. Therefore, we can see that club's brand value-creation has

269 considerable growth. In addition, emphasis on invisible capital such as brand equity, brand
270 loyalty, perceived brand quality, brand associations, and innovation level along with legislation
271 that motivates clubs to become more professional can improve this growth in the period of study.

272 Here we present strategies based on analysis of the environment and experts' opinions
273 considering the role of policy makers in the management of club brand's value-creation.
274 Moreover, their effects on systems operation are studied through analysis of simulation results.
275 The considered scenarios based on the experts' opinions are as follows:

- 276 • **Scenario 1 (Concentration of internal branding).** Internal branding can be considered
277 as a strategy for some of the weaknesses of clubs such as insufficient fame of players and
278 the technical team due to the undeniable role of human power in branding. It can provide
279 a positive image of the club for the stakeholders. Therefore, in this scenario, the role of
280 internal branding at its high level along with the moderate value of technical and
281 managerial employees and low value of players on the club brand's value-creation is
282 studied. The obtained results indicate that effective implementation of internal branding
283 plans in local clubs can have a considerable effect on the improvement of employees
284 about the club's brand and the improvement of the club's image in the minds of its
285 stakeholders. On the other hand, special attention to players and employees would
286 increase brand loyalty (reduce players' quitting the club) which is an important factor in
287 value-creation. We can create value for a club by paying attention to little-known but
288 capable players and having an average technical team even though the presence of star
289 players in a club has a key value in the minds of its stakeholders. This would cause an
290 increase in other key factors of brand value-creation such as brand equity, number of
291 fans, and sponsorship support.

- 292 • **Scenario 2 (Star players).** Players and technical teams are the two most important assets
293 of a club. Although players are a brand by themselves, they have a very important role in
294 the club's branding. Expansion of a club's social responsibility efforts is another means
295 of branding. Thus, a club's value-creation through star players, average executives and
296 managers, and a limited level of social responsibility efforts in this scenario. The
297 obtained results from the simulation of this scenario indicate that a club's brand equity
298 can have a considerable improvement with star players, an acceptable executive, and
299 technical team. Moreover, a club's perceived brand quality, brand association, fame,
300 value, and image will improve due to the attractiveness of players for the fans.
301 Ultimately, attention to the mentioned points will lead to a considerable improvement in
302 the club's brand value-creation. Moreover, all clubs must take every possible step in the
303 improvement of their value-creation due to the role that social responsibility and making
304 a desirable image play in society.
- 305 • **Scenario 3 (Star players and donations).** Providing sustainable income sources has
306 always been very important for clubs. Since the government has sole ownership of
307 broadcast rights for which no money is given to the clubs, most efforts of volleyball
308 teams in Iran have been focused on receiving government donations. The Club's brand
309 value-creation in the presence of star players, limited income from TV broadcast rights,
310 and an average amount of donations from the stakeholders is studied in this scenario. The
311 obtained results indicate a reduction in total revenue and financial capital due to limited
312 sources of club revenue and especially not benefitting from TV broadcast rights. Despite
313 this fact, an acceptable amount of brand value-creation is observed in this scenario since
314 star players help attract more fans, increase the trust of fans in the club, and more

315 satisfaction. Moreover, there has been considerable growth in brand loyalty, perceived
316 brand quality, brand association, brand equity, and support of financial supporters.

317 • **Scenario 4 (Hybrid scenario).** In this scenario, the club brand's value-creation is high
318 by focusing on high-quality players, a high-level marketing mix, low levels of internal
319 branding, donations, social responsibility, and executive and technical teams. Marketing
320 mix activities such as improvement of conditions of places where services are provided,
321 improving distribution channels (such as internet purchase of sports event tickets),
322 providing competitive prices, and motivation for stakeholders through effective means. In
323 addition to effective executive processes (such as before and after the games), it is able to
324 improve perceived brand quality for the club's brand. In contrast, using star players
325 would provide positive associations in the minds of the stakeholders that would be seen
326 in the form of loyalty to the club and an increased number of fans. In these conditions,
327 the overall capital will increase due to increased human and social capital of the club
328 despite the increased costs of employment of star players and constant level of
329 innovations. Overall, employing star players and concentrating on the marketing mix can
330 compensate a lot for other deficiencies. This is a desirable scenario for managers since it
331 includes a series of controllable variables and external factors have very little effect.

332 • **Scenario 5 (Club is negligent of its social responsibilities).** In this scenario – given the
333 importance of social responsibility activities - we try to study clubs' brand value-creation
334 in the usual conditions of Iranian clubs given the importance of social responsibility
335 activities. Most of these clubs usually employ star players, obtain high-level donations,
336 and ignore social responsibility. Implementation of this scenario indicates considerable
337 improvement in value-creation that happens with improved fame of the club, number of

338 fans, brand equity, perceived brand quality, brand association, brand loyalty, sponsors,
339 and capital. Star players can attract the media and repeat the name of the club, the club's
340 attractiveness, improved performance, and perceived brand quality for the stakeholders.
341 Anyway, paying attention to social responsibility is important for maintaining the growth
342 of the number of fans in the long run. If social responsibility is used as an empowerment
343 tool by the club, it can result in high spiritual improvement like improved social
344 attractiveness which is followed by pursuing activities (such as purchasing the club's
345 products, watching TV, or attending competitions) leading to increased financial profit.

- 346 • **Scenario 6 (Star clubs and modern communications).** In this hybrid scenario, the
347 purpose is to improve value-creation by using valuable human capital, high-level
348 donations, and emphasis on stakeholders through active participation in online brand
349 communities, medium activities in social responsibilities, low-level marketing mix, and
350 internal branding. The results obtained from the simulation of this scenario indicate
351 desirable growth in the club's brand value-creation. Employment of high-level players
352 and coaches, and obtaining government aid (whether right or wrong) can lead to more
353 successful technical performance and fewer financial problems. Thus, there would be a
354 higher perceived club brand quality. Alternatively, the relationship of clubs with the
355 community in the form of participation in philanthropic affairs, environmental activities,
356 and meeting the economic needs of the community can create positive associations in the
357 community. Active participation in online brand communities can strengthen the links
358 between clubs, fans, and other stakeholders; it would not only increase their number but
359 turn them into loyal persons who even advertise for the club. Overall, the obtained results
360 from this scenario indicate that club investments of a combination of donations, human

361 capital, social responsibility, and online societies are more effective than other
362 investment activities (such as internal branding, marketing mix, special income sources,
363 physical capital, etc.).

364 • **Scenario 7 (Least attention paid to internal branding).** Although internal branding has
365 become one of the main recent empowerment factors in branding for organizations, this
366 scenario seeks to study brand value-creation with weak internal branding and strong
367 human capital. The results obtained from the simulation of this scenario indicate very
368 appropriate growth in the club's brand value-creation. This implies that the presence of
369 high-level human capital makes it unnecessary for the club to invest in internal branding
370 and other acts such as training and development. In other words, this human capital can
371 realize the adaptation and socialization of the club faster and have a high level of
372 performance in the new conditions. With increased media attention, this issue can bring
373 more fame, more fans, and stronger sponsors for the club and meet the expectations of
374 the stakeholders. Thus, the outstanding characteristics of human capital result in effective
375 communication with the customers and club stakeholders create some belief about the
376 characteristics and advantages of the club's brand in society.

377 • **Scenario 8 (Ethical club).** In this scenario, brand value-creation is studied given human
378 capital, high level of social responsibility, low-level marketing, and average income. The
379 obtained results from this scenario indicate increased brand value-creation through the
380 proper increase in capital, brand equity, associations, perceived brand quality, support of
381 sponsors, and loyalty. A club is a human, social, and operational organization that can
382 increase cultural issues through active participation and reduce stress. Presence in social
383 affairs and welfare activities, and consideration of benefits of future generations in

384 utilizing resources can affect public opinion and bring about benefits such as increased
385 brand equity and a considerable increase in value-creation by attracting stakeholders,
386 especially fans. Of course, the sudden drop in the level of loyalty in the few middle years
387 during the period of study can be because of the social responsibility acts along with a
388 high level of human capital cannot yield good results without marketing activities
389 (marketing mix or online social communities) to create trust, and positive opinions and
390 behavior.

391 **4.4. Evaluation and ranking of strategies**

392 The main objective of this study is to rank the considered strategies using managerial measures.
393 This was achieved by applying fuzzy ANP (Analytic Network Process) and fuzzy TOPSIS
394 (Technique for Order Preference by Similarity to Ideal Solution) methods to handle the
395 uncertainty of qualitative criteria assessment based on the experts' opinions [41]. Buckley's
396 geometric average of weights was used to do a pairwise comparison to implement the fuzzy ANP
397 method. Next, the weights were placed in the initial ANP supermatrix to calculate the weighted
398 and bounds supermatrices to find the final fuzzy ANP weights. Nine key criteria in this research
399 were selected using library studies and the opinions of 15 experts in the field of sports
400 management and marketing. All of the nine used measures in this study had internal relationships
401 with each other. Thus, a pairwise comparison of the nine measures relative to the goal (Table 1)
402 and computation of fuzzy and non-fuzzy weights of the measures was done at first (Table 2).
403 Finally, the management strategies were obtained based on the expert's opinion, using the ANP
404 multi-criteria decision-making, and TOPSIS methods. The shown results in Table 3 show that
405 scenario 3 has the highest priority. Next in rank are scenarios 7 and 5. The markings in the
406 following tables are: C1 (Perceived Brand Quality), C2 (Brand Loyalty), C3 (Capitals), C4

407 (Number of Fans), C5 (Innovation), C6 (Brand Equity), C7 (Sponsorship Support), C8
408 (Federation), and C9 (Brand Associations).

409 **5. Conclusions and managerial insights**

410 Branding is one of the new approaches for value-creation. Branding can be an important strategy
411 in businesses, and it is an undeniable necessity for the robustness of a club in the minds of its
412 stakeholders. Better brands unconsciously cause value-creation for the stakeholders. Although a
413 lot of studies have been previously done on finding the factors that affect branding and value-
414 creation, this concept has still not been sufficiently investigated due to its dynamic nature. A
415 problem that must be considered is the lack of a comprehensive model that includes all the
416 various factors that affect brand value-creation and all clubs' stakeholders and can run
417 simulations using present conditions until a long period later. The system dynamics analysis
418 method is used to analyze and evaluate due to the presence of various complicated relationships
419 with time-dependent feedback loops in the brand value-creation system. Therefore, the design of
420 a dynamic model for Iran's Super League volleyball clubs' brand value-creation can be a good
421 policy for their policymakers.

422 Implementation of the ethical club (scenario 8) shows that changes in any of the variables in
423 the model would lead to improvement in the club's brand value-creation. This indicates that most
424 of the variables identified in the model are in poor condition now. Therefore, improvements in
425 any one can have a positive effect on the results of the model. Thus, it seems that focusing on
426 human capital, especially star players and active participation in online brand communities can
427 create more value than other factors. Star players and donations and the least attention paid to
428 internal branding (scenarios 3 and 7) are clearly shown to be ranked first and second. In other

429 words, the skills, capabilities, and technical level of players, coaches, and managers can produce
430 a positive view of the club by showing the club's salient assets. Therefore, human capital is a
431 form of capital that can create a lot of value for the club. Some of these results are also present in
432 the research of Malik et al. [20], Spender [18], and Sajjadi et al. [33]. Instead, easy and public
433 access to the internet and virtual networks as new technologies, has provided the means for clubs
434 to establish effective communications with their stakeholders with very little effort and cost in
435 online communities that will ultimately lead to the club's brand value-creation. The research of
436 Zhou et al. [28] confirms the importance of activity in online brand communities in brand value-
437 creation.

438 The club is negligent of its social responsibilities (scenario 5) which was ranked the third
439 highest priority scenario in this research study places very little emphasis on social
440 responsibility. It is expected that social and environmental concerns play an important role in
441 clubs' brand value-creation given the increased public awareness and sensitivity. The results of
442 research by Bardos et al. [29] indicate the importance of the role of social responsibility in value-
443 creation in organizations. Also, the findings of Jalonen et al. [13] show the effective position of
444 social responsibility in the value-creation of sports brands. Evaluation of this scenario indicates
445 that despite the low level of social responsibility, clubs' brand value-creation is desirable. This
446 may be because the presence of star players and access to government donations are the most
447 important factors in branding and value-creation for Iran's volleyball clubs at present conditions.
448 Government aid is of importance since Iranian clubs are deprived of many trade rights such as
449 broadcasting rights, copyright, presence of female fans in the stadiums, etc. due to government
450 regulations. Therefore, donations are one of their most important income sources. Overall,
451 despite the importance of social responsibility, it is not considered to have any priority in Iran's

452 volleyball due to a lack of attention to more important factors in business and sports. In the long
453 term, there will be more attention paid to social responsibility with reduced perceived risks by
454 the stakeholders, improved brand value, and gained financial advantages. High-level players and
455 technical staff, proper use of online brand communities, and access to government donations are
456 the most important three variables that affect Iran's volleyball clubs' brand value-creation.

457 Focusing policy makers and managers of volleyball clubs on sources of income is also
458 important besides the three mentioned factors. TV broadcast rights are among the most important
459 sources of income for sports clubs in the world [45]. This is so important that clubs or the league
460 put the TV broadcasting rights for their competitions on auction and sell these rights at the
461 highest price. However, the TV and internet broadcast rights of sports competitions are solely
462 given to government TV stations which do not pay anything to the clubs. Deprivation from this
463 income source (especially for private clubs) has led to their inability to pay the players and
464 coaches and at times it has resulted in their bankruptcy. Another common method of covering the
465 expenses of sports clubs is getting sponsors to whom the club gives the right to advertise to
466 companies and large businesses. At present, most Iranian clubs rely on financial support,
467 especially from the government, and do not pay much attention to attracting sponsors.
468 Benefitting from various income sources is very important for clubs in a competitive trade. This
469 provides for increased financial capital for the clubs, increased stock value for the shareholders,
470 and ultimately increased value-creation for the clubs.

471 The present research study has developed a comprehensive model for volleyball clubs'
472 brand value-creation by considering the various club stakeholders and the various factors that
473 affect them. The model has been simulated for a long period and it predicts changes and is thus
474 considered to be a new research study. However, studying each club individually by considering

475 its conditions can show its applicability and prepare the grounds for more applied models. On the
476 other hand, the choice of variables for the present model has been made based on the existing
477 Iranian clubs which are mostly public and dependent on the federation. It is suggested that in
478 future studies, the design of system dynamics for clubs' brand value-creation is done assuming
479 that the clubs are independent of the federation and there are changes in the league's governance
480 method. In other words, moving towards the commercialization of clubs will require a long
481 process and it would lead to changes in the main stakeholders (such as change of owners), the
482 number of variables in the model, and the type of relationships that exist between the variables
483 which would be interesting to study.

484 Based on the results of the current research, the direction of future studies could be on
485 creating financial and non-financial value simultaneously in sports clubs and not only
486 shareholders but also other stakeholders of the club. It seems like this should be a topic with a
487 focus on modern social media and online environments. An important part of the results of the
488 current research emphasizes these variables and is being developed

489 **6. References**

- 490 1. Kahkonen, A.K., and Lintukangas, K. "Key dimensions of value creation ability of supply
491 management", *International Journal of Operations & Production Management*, 38(3),
492 pp.979-996 (2018), doi: 10.1108/IJOPM-04-2016-0189.
- 493 2. Szymoszowskyj, A., Winand, M., Kolyperas, D., and Sparks, L. "Professional football clubs
494 retail branding strategies", *Sport, Business and Management: An International Journal*,
495 6(5), pp.579-598 (2016), doi: 10.1108/SBM-09-2016-0048.

- 496 3. Sandberg, E., Pal, R., and Hemilä, J. "Exploring value creation and appropriation in the
497 reverse clothing supply chain", *The International Journal of Logistics Management*,
498 29(1), pp.90-109 (2018), doi: 10.1108/IJLM-10-2016-0241.
- 499 4. Sheth, H., and Babiak, K. M. "Beyond the game: Perceptions and practices of corporate social
500 responsibility in the professional sport industry", *Journal of Business Ethics*, 91(3),
501 pp.433-450 (2010), doi: 10.1007/s10551-009-0094-0.
- 502 5. Hilles, G. E., Hultman, C. M., and Miles, M. P. "The evolution and development of
503 entrepreneurial marketing", *Journal of Small Business Management*, 46(1), pp.99-112
504 (2008), doi: 10.1111/j.1540-627X.2007.00234.x.
- 505 6. Scammell, M. "Politics and image: the conceptual value of branding", *Journal of Political*
506 *Marketing*, 14(1-2), pp.7-18 (2015), doi: 10.1080/15377857.2014.990829.
- 507 7. Hoonsopon, D., and Ruenrom, G. "The impact of organizational capabilities on the
508 development of radical and incremental product innovation and product innovation
509 performance", *Journal of Managerial Issues*, pp. 250-276 (2012), doi:
510 jstor.org/stable/43488811.
- 511 8. Carlsson, B. "Insolvency and the domestic juridification of football in Sweden", *Soccer &*
512 *Society*, 10(3-4), pp.477-494 (2009), doi: 10.1080/14660970902771522.
- 513 9. Tianze, L., Haiying, W. "Service branding: a perspective of value co-creation orientation",
514 *Journal of Service Science and Management*, 11, pp.256-266 (2018), doi:
515 10.4236/jssm.2018.112018.
- 516 10. Seikkula-Leino, J. "A review of entrepreneurship education in teacher education", *Malaysian*
517 *Journal of Learning and Instruction*, 15(1), pp.105-148 (2018), doi:
518 0.32890/mjli2018.15.1.5.

- 519 11. Melovic, B., Mitrovic, S., Djokaj, A., and et all. "Integrated marketing communications as a
520 function of brand development", *Construction of Unique Buildings and Structures*,
521 12(27), pp.24-31 (2014), doi: scidar.kg.ac.rs/handle/123456789/16529.
- 522 12. Gummerus, J. "Value creation processes and value outcomes in marketing theory: strangers
523 or siblings? ", *Marketing Theory*, 13(1), pp.19-46 (2013), doi:
524 10.1177/1470593112467267.
- 525 13. Jalonen, H., Tuominen, S., Ryömä, A., and et all. "How does value creation manifests itself
526 in the nexus of sport and business?: a systematic review of literature", *Open Journal of*
527 *Business and Management*, 6(1), pp.103-138 (2018), doi: 10.4236/ojbm.2018.61008.
- 528 14. Homburg, C., Jozić, D., and Kuehnl, C. "Customer experience management: toward
529 implementing an evolving marketing concept", *Journal of the Academy of Marketing*
530 *Science*, 45(3), pp.377-401 (2017), doi: 10.1007/s11747-015-0460-7.
- 531 15. Bulgarelli, F. and Legland, P. "Methods of brand valuation", Master Thesis S46365 (2015).
- 532 16. Gronroos, C., and Helle, P. "Adopting a service logic in manufacturing: Conceptual
533 foundation and metrics for mutual value creation", *Journal of Service Management*,
534 21(5), pp.564-590 (2010), doi: 10.1108/09564231011079057.
- 535 17. Liepe, Z., and Sakalas, A. "Evaluation of human capital role in the value creation process",
536 *Procedia-Social and Behavioral Sciences*, 156, pp.78-82 (2014), doi:
537 10.1016/j.sbspro.2014.11.123.
- 538 18. Spender, J. "Managing the engines of value-creation", *Real-World Econ Rev*, 83, pp.99-115
539 (2018), doi: <http://www.paecon.net/PAERReview/issue83/Spender83.pdf>
- 540 19. Anker, T. B., Sparks, L., Moutinho, L., and et all. "Consumer dominant value creation: A
541 theoretical response to the recent call for a consumer dominant logic for marketing",

- 542 European Journal of Marketing, 49(3/4), pp.532-560 (2015), doi: 10.1108/EJM-09-2013-
543 0518.
- 544 20. Malik, A., Pereira, V., & Budhwar, P. "Value creation and capture through human resource
545 management practices: Gazing through the business model lens", *Organizational*
546 *Dynamics*, 47(3), pp.180-188 (2018), doi: 10.1016/j.orgdyn.2017.09.002.
- 547 21. Holmqvist, J., Visconti, L. M., Grönroos, C., and et all. "Understanding the value process:
548 Value creation in a luxury service context", *Journal of Business Research*, 120, pp.114-
549 126 (2020), doi: 10.1016/j.jbusres.2020.07.002.
- 550 22. Ida, E. "The role of customers' involvement in value co-creation behaviour is value co-
551 creation the source of competitive advantage?", *Journal of Competitiveness*, 9(3), pp.51-
552 66 (2017), doi: 10.7441/joc.2017.03.04.
- 553 23. Kim, K., Byon, K. K., and Baek, W. "Customer-to-customer value co-creation and co-
554 destruction in sporting events", *The Service Industries Journal*, 40(9-10), pp.633-655
555 (2020), doi: 10.1080/02642069.2019.1586887.
- 556 24. van Oijen, P. "Driving value creation through proper design of goal realization frameworks",
557 *Journal of Creating Value*, 6(2), pp.271-285 (2020), doi: 10.1177/2394964320938220.
- 558 25. Aaker DA. "Managing brand equity: Capitalizing on the value of a brand name", *Simon and*
559 *Schuster* (2009), doi: 978-1-4391-8838-5.
- 560 26. Harjanto, H. C., Ellitan, L., and Muljani, N. "The influence of brand experience and
561 emotional attachment on brand trust and brand loyalty Church Mawar Sharon, West
562 Surabaya", *Rima-Research In Management and Accounting*, 4(1), pp.24-36 (2021), doi:
563 10.33508/rima.v4i1.3062.

- 564 27. Abbas, U., Islam, K. A., Hussain, S., and et all. "Impact of brand image on customer loyalty
565 with the mediating role of customer satisfaction and brand awareness", *International*
566 *Journal of Marketing Research Innovation*, 5(1), pp.1-15 (2021), doi:
567 10.46281/ijmri.v5i1.987.
- 568 28. Zhou, Z., Wang, R., and Zhan, G. "Cultivating consumer subjective well-being through
569 online brand communities: a multidimensional view of social capital", *Journal of Product*
570 *& Brand Management*, 31(5), pp.808-822 (2021), doi: 10.1108/JPBM-12-2020-3267.
- 571 29. Bardos, K. S., Ertugrul, M., and Gao, L. S. "Corporate social responsibility, product market
572 perception, and firm value", *Journal of Corporate Finance*, 62, pp.1-40 (2020), doi:
573 0.35313/ijabr.v4i2.284.
- 574 30. Kurznack, L., Schoenmaker, D., and Schramade, W. "A model of long-term value creation",
575 *Journal of Sustainable Finance & Investment*, pp.1-19 (2021), doi:
576 10.1080/20430795.2021.1920231.
- 577 31. Hosseini, H., Bahrololoum, H., Andm, R., and et all. "Identifying factors affecting the brand
578 value creation of volleyball clubs: a study of the iranian super league", *Research in Sport*
579 *Management and Marketing (RSMM)*, 3(3), pp. 47-60 (2022), doi:
580 10.22098/RSMM.2022.1790.
- 581 32. Gomez, S., Kase, K., and Urrutia, I. "Value creation and performance criteria for sport
582 entities", *Value Creation and Sport Management*, Cambridge University Press, pp.1-6
583 (2010), doi: 9780521199230.

- 584 33. Sajjadi, S. N., Tarighi, R., and Abedlati, M. "Prioritizing the factors affecting brand equity of
585 popular football clubs in iran", *Annals of Applied Sport Science*, 5(3), pp.87-93 (2017),
586 doi: 10.29252/acadpub.aassjournal.5.3.87.
- 587 34. Irwin RL, Sutton WA, McCarthy LM. "Sport promotion and sales management". *Human*
588 *Kinetics*; 2008, doi: 978-0-7360-6477-4.
- 589 35. Kolyperas, D., Maglaras, G., and Sparks, L. "Sport fans' roles in value co-creation",
590 *European Sport Management Quarterly*, 19(2), pp.201-220 (2019), doi:
591 10.1080/16184742.2018.1505925.
- 592 36. Seifi Salmi, T., Benar, N., and Honari, H. "Identifying value creation strategies in the brand
593 communities of sport clubs based on the use of social media", *Annals of Applied Sport*
594 *Science*, 7(2), pp.55-61 (2019), doi: 10.29252/aassjournal.7.2.55.
- 595 37. Sterman, j. d. "Business dynamics: systems thinking and modeling for a complex world",
596 New York: mcgraw-hill, 34(4), pp.324-327 (2000), doi:
597 researchgate.net/publication/44827001.
- 598 38. Pishghadam, H. K., Esmaceli, H. "A system dynamics model for evaluating the firms'
599 capabilities in maintenance outsourcing and analyzing the profitability of outsourcing",
600 *Scientia Iranica*, 30, 2, PP12-726 (2023), doi: 10.24200/sci.2021.55108.4080
- 601 39. Sharifi, A., Aghaie, A. "A non-convex robust simulation optimization model for inventory
602 management problem by system dynamics", *Scientia Iranica*, 2021, Dec 6. doi:
603 10.24200/sci.2021.58733.5869
- 604 40. Day Dr, J., and Kour, G. "Destination brand equity and value creation for internal
605 stakeholders", *Travel and Tourism Research Association: Advancing Tourism Research*
606 *Globally* (2023), doi: scholarworks.umass.edu/ttra/2023/qualitative/2.

- 607 41. Wichmann, J. R., Uppal, A., Sharma, A., and et all. "A global perspective on the marketing
608 mix across time and space", *International Journal of Research in Marketing*, 39(2), 502-
609 521 (2022), doi: 10.1016/j.ijresmar.2021.09.001.
- 610 42. Tsiotsou, R. H., and Diehl, S. "Delineating transformative value creation through service
611 communications: an integrative framework", *Journal of Service Management*, 33(4/5),
612 pp.531-551 (2022), doi: 10.1108/JOSM-11-2021-0420.
- 613 43. Dameri, R. P., and Ferrando, P. M. "Value creation disclosure: the international integrated
614 reporting framework revisited in the light of stakeholder theory", *Meditari Accountancy
615 Research*, 30(3), 739-761(2022), doi: 10.1108/MEDAR-11-2020-1103.
- 616 44. Noll, R. G. "Broadcasting and team sports", *Scottish Journal of Political Economy*, 54(3),
617 pp.400-421 (2007), doi: 10.1111/j.1467-9485.2007.00422.x.
- 618 45. Hisham, S. F. S. H., Ahmad, N., Yusof, Z. M., and Aini, H. N. "An application of fuzzy ANP
619 in evaluating stress factors among university's students during online distance learning",
620 Paper presented at the *Journal of Physics: Conference Serie*, 2084(1), pp.1-11 (2021),
621 doi: 10.1088/1742-6596/2084/1/012014/meta.

622

623 **7. Appendices:**

624 **7.1. Biography**

625 **Helen Hosseini** received her PhD from Shahrood University of Technology in Iran. Her research
626 interests include value creation; sports management, human resource development, and resource
627 management in sports. Her work has appeared in such journals as *Sports Physiology and*

628 Management investigation, Research in Sport Management and Motor Behavior, and sport
629 management studies.

630 **Hassan Bahrololoum** received his PhD from Tarbiat Moalem University of Tehran
631 (Management and planning in physical education). He is currently an Associate Professor of
632 Physical Education at Shahrood University of Technology, Iran. His current research interests
633 include Sports management and psychology. He has also published several papers in
634 International Journals. He has authored the book Basics of Sports Organization Management.

635 **Reza Andam** received his PhD from Gilan University (Management and planning in physical
636 education Human resources orientation). He is currently an Associate Professor of Physical
637 Education at Shahrood University of Technology, Iran. His current research interests include
638 Human resource management with the approach of volunteers. He has also published several
639 papers in International Journals. He has also authored books such as a guide to teaching physical
640 education in schools, advanced management in sports and public sports.

641 **Aliakbar Hasani** is currently an Associate Professor of Industrial Engineering at Shahrood
642 University of Technology, Iran. His current research interests include supply chain management,
643 production planning and scheduling, multi-objective optimization problems, meta-heuristics,
644 quality management, and productivity. He has also published several papers in International
645 Journals such as International Journal of Production Research, Transportation Research Part E,
646 Journal of Cleaner Production, Computers & Chemical Engineering, Socio-Economic Planning
647 Sciences, Journal of Manufacturing Systems, Resources Policy, and Safety Science.

648 **Hadi Bagheri** received his PhD from Tarbiat Modares University at Tehran (Sport Management).
649 He is currently an Associate Professor of Physical Education at Shahrood University of

650 Technology, Iran. He has about 15 years of research experience in the fields of sports fan
651 behavior, football management and sports marketing.

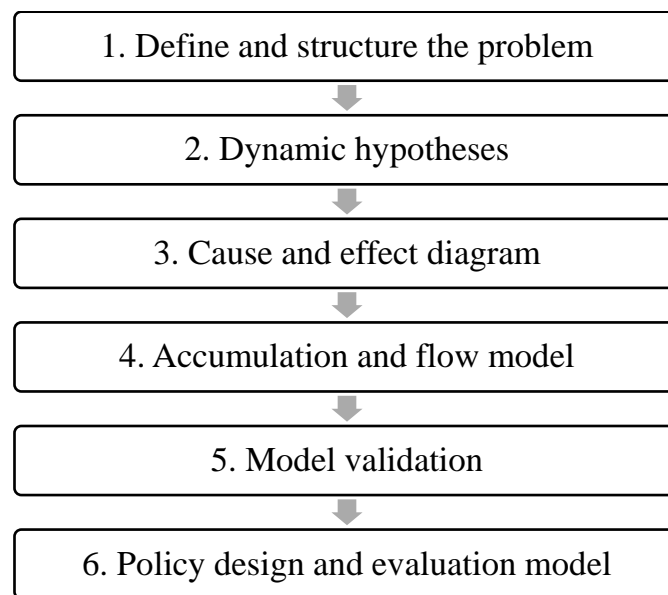
652

653

654

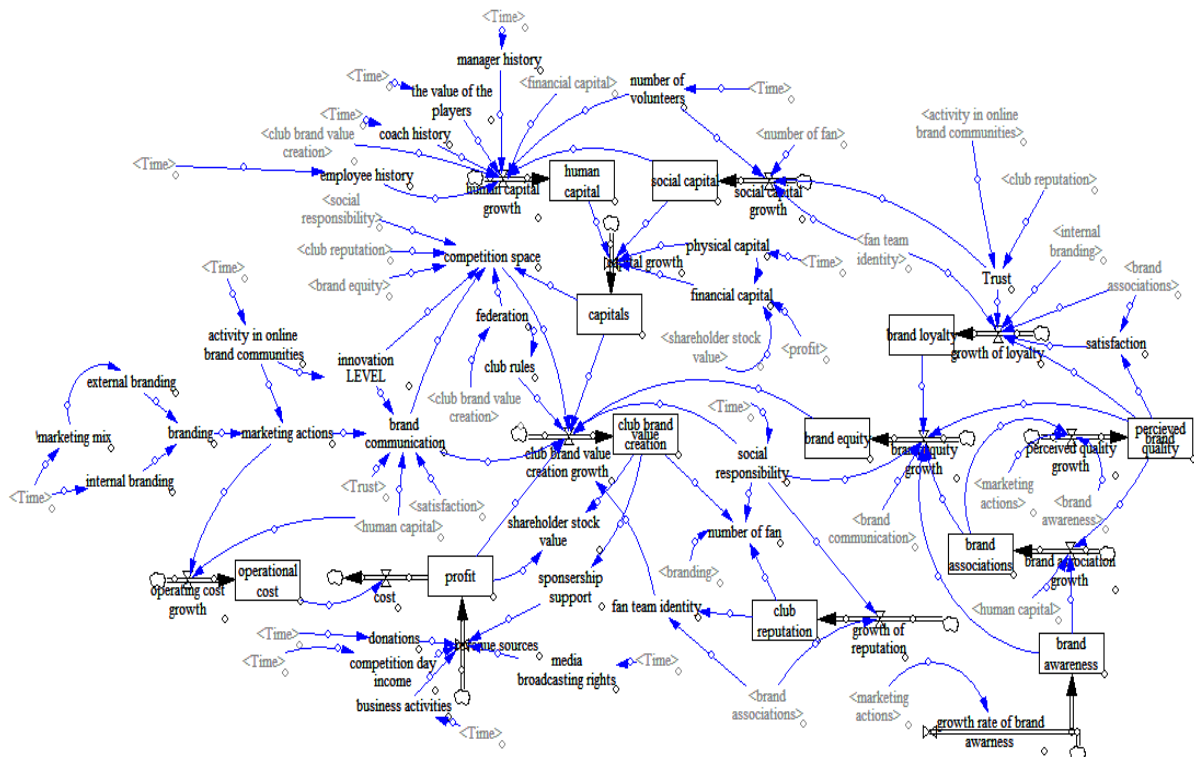
655 7.2. Figures

656



657

658 Figure 1. Stages of modeling by using the system dynamics approach



662

663

Figure 3. Accumulation and flow diagram of brand value-creation of sports clubs

664

665

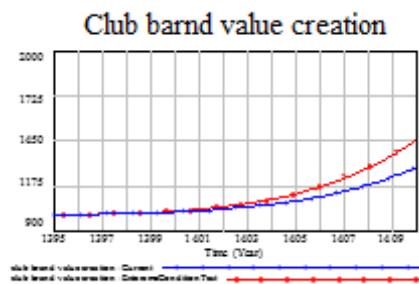


Figure 4. a

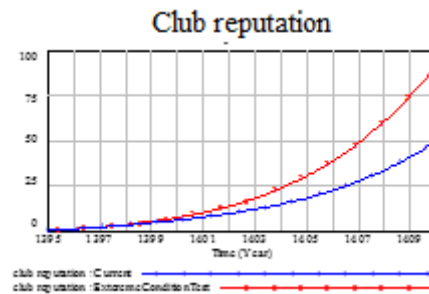
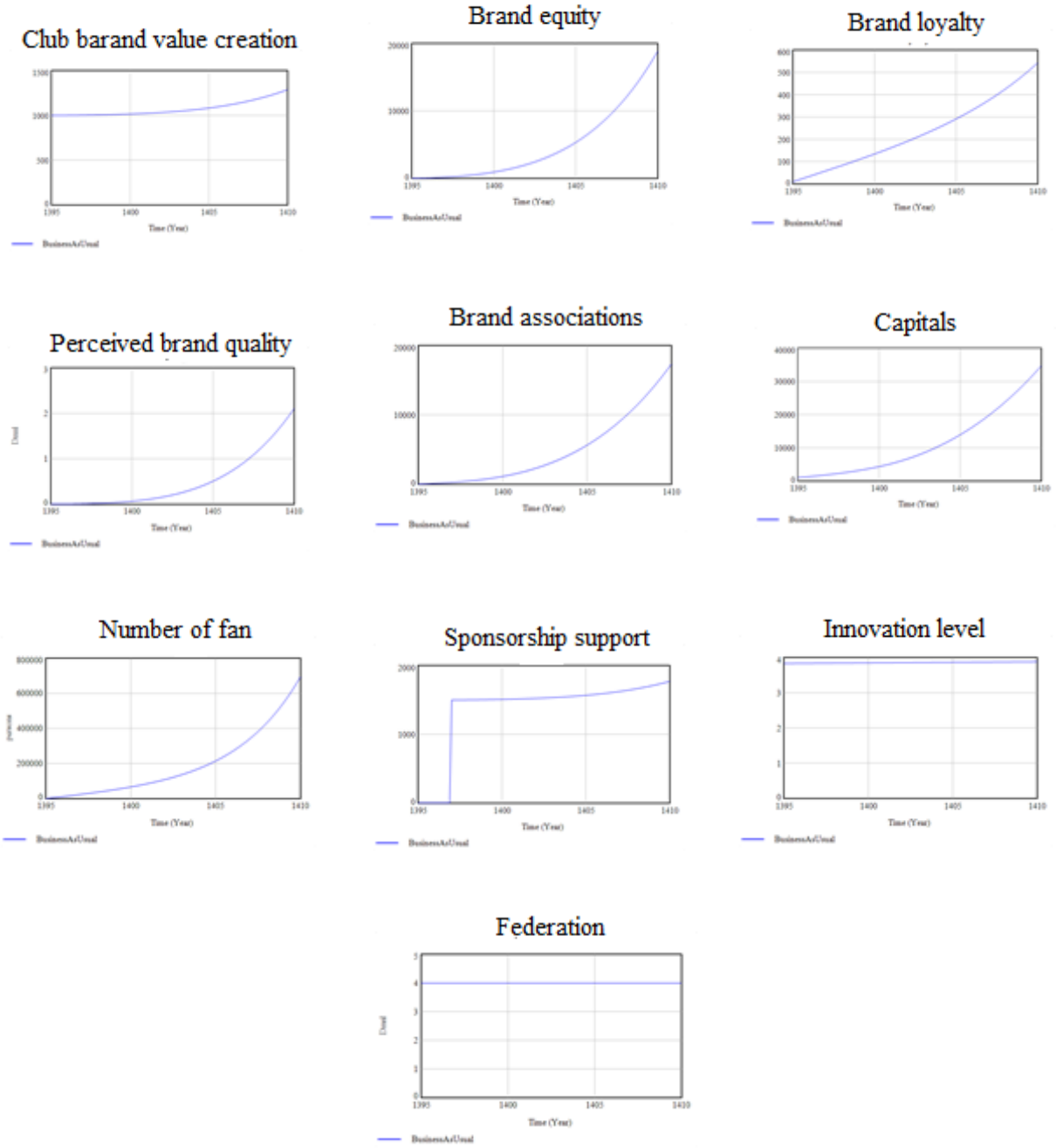


Figure 4. b

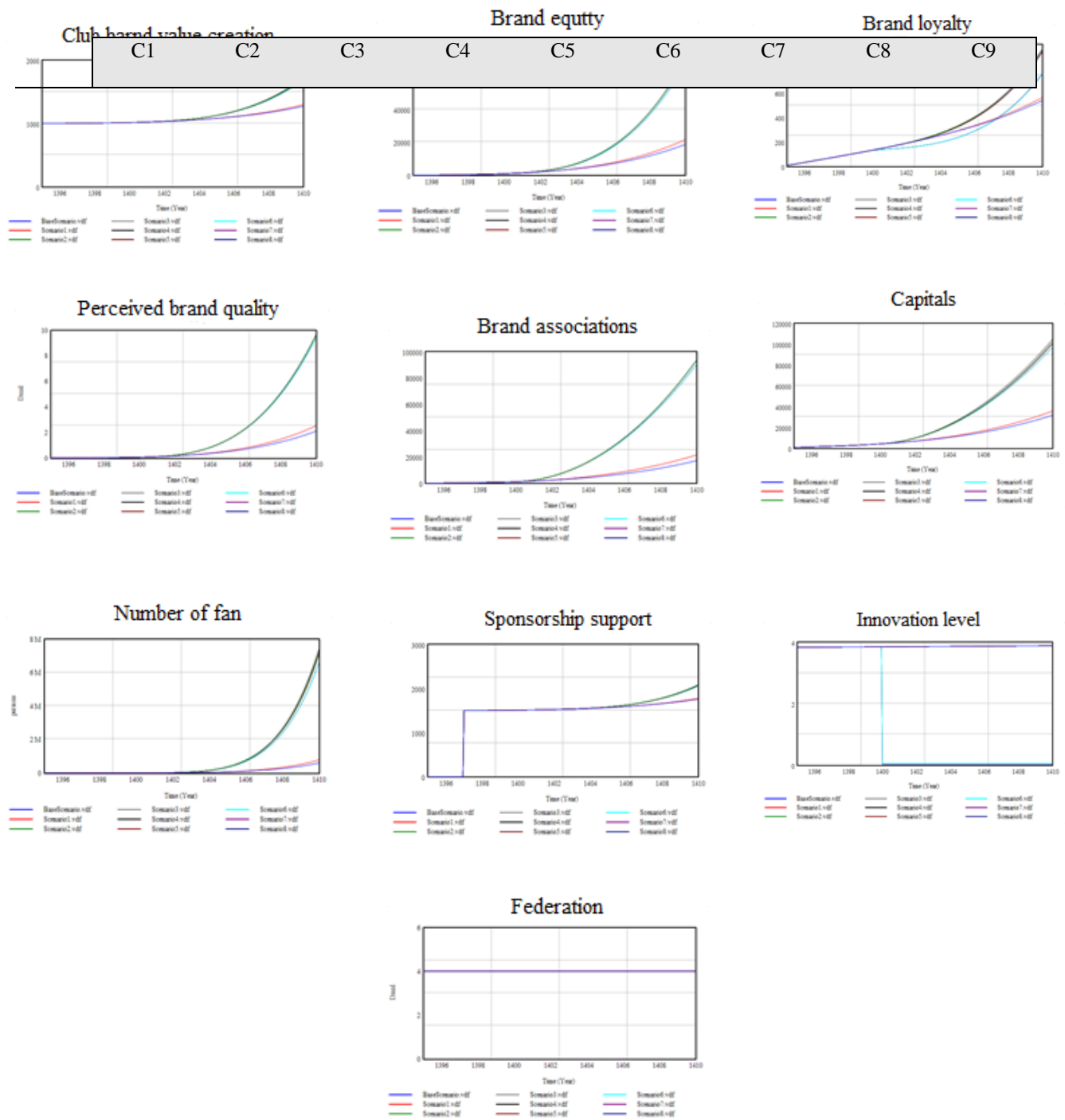
Figure 4. Results of the validation of the research model

666



667

Figure 5. Simulation of present conditions



668 Figure 6. Simulation results for considered planning period

669 **7.3. Tables**

670 Table 1. paire wise comparison of measures (incompatibility rate: 0.07)

C1	(1,1,1)	(4.58,5.6 1,6.63)	(0.43,0.5 2,0.64)	(2.84,3.4 6,4.08)	(1.58,2.2 2,2.61)	(0.80,0.9 4,1.10)	(2.39,3.0 2,3.65)	(3.38,6.4 0,7.41)	(1.56,1.8 5,2.22)
C2	(0.15,0.1 8,0.22)	(1,1,1)	(0.39,0.4 5,0.54)	(0.78,0.9 9,1.19)	(1.06,1.3 1,1.59)	(0.21,0.2 4,0.28)	(0.84,1.0 8,1.33)	(1.13,1.3 6,1.63)	(0.20,0.2 4,0.29)
C3	Measure	$((\prod_{j=1}^n \tilde{P}_{ij})^{1/n})$	(\tilde{W})	Fuzzy weight	Non – fuzzy	Normal weight			7,2.4
	1,2.29)	1,2.58)	(0.43,0.5 2,0.64)	1,0.98)	8,1.88)	4,1.84)	2,2.63)	4,4.80)	7,3.03)
C4	(0.24,0.2 9,0.35)	(0.83,1.0 1,1.28)	(1.01,1.2 3,1.51)	(1,1,1)	(1.83,2.2 2,2.64)	(0.79,0.9 6,1.15)	(1.61,1.8 8,2.16)	(2.87,3.6 3,4.41)	(1.39,1.6 3,1.90)
C5	(0.38,0.4 5,0.53)	(0.63,0.7 6,0.94)	(0.53,0.6 3,0.76)	(0.38,0.4 5,0.45)	(1,1,1)	(0.33,0.3 7,0.44)	(0.22,0.2 6,0.31)	(0.88,1.2 7,1.91)	(0.64,0.7 3,0.83)
C6	(0.90,1.0 6,1.25)	(3.52,4.1 3,4.76)	(0.54,0.6 5,0.78)	(0.86,1.0 4,1.25)	(2.28,2.6 5,3.03)	(1,1,1)	(1.95,2.3 3,2.37)	(2.17,2.5 3,2.91)	(3.13,3.7 7,4.44)
C7	(0.27,0.3 3,0.42)	(0.75,0.9 2,1.19)	(0.38,0.4 5,0.55)	(0.46,0.5 3,0.62)	(3.27,3.8 8,4.50)	(0.36,0.4 3,0.51)	(1,1,1)	(1.68,2.1 0,2.55)	(0.20,0.2 3,0.27)
C8	(0.13,0.1 5,0.18)	(0.61,0.7 3,0.88)	(0.21,0.2 4,0.28)	(0.22,0.2 7,0.35)	(0.52,0.7 9,1.14)	(0.34,0.3 9,0.46)	(0.39,0.4 7,0.59)	(1,1,1)	(0.29,0.3 4,0.40)
C9	(0.45,0.5 4,0.64)	(3.40,4.1 0,4.85)	(0.33,0.4 0,0.50)	(0.52,0.6 1,0.71)	(1.21,1.3 7,1.56)	(0.22,0.2 6,0.32)	(3.65,4.2 6,4.90)	(2.50,2.9 2,3.41)	(1,1,1)

671

672

673

674

675

676

677

678

679

680

Table 2. fuzzy and non – fuzzy weights for measure

	Geometric average		weight	
C1	(1.77, 2.09, 2.44)	(0.15, 0.20, 0.27)	(0.206)	(0.201)
C2	(0.50, 0.59, 0.7)	(0.04, 0.06, 0.08)	(0.059)	(0.057)
C3	(1.50, 1.79, 2.09)	(0.12, 0.17, 0.24)	(0.177)	(0.172)
C4	(1.08, 1.27, 1.49)	(0.09, 0.12, 0.17)	(0.126)	(0.123)
C5	(0.50, 0.59, 0.71)	(0.04, 0.06, 0.08)	(0.059)	(0.057)
C6	(1.53, 1.77, 2.04)	(0.12, 0.17, 0.23)	(0.175)	(0.171)
C7	(0.62, 0.73, 0.86)	(0.05, 0.07, 0.10)	(0.073)	(0.071)
C8	(0.35, 0.42, 0.50)	(0.03, 0.04, 0.06)	(0.042)	(0.041)
C9	(0.95, 1.10, 1.28)	(0.08, 0.11, 0.14)	(0.109)	(0.107)
$\sum \left(\prod_{j=1}^n \tilde{P}_{ij} \right)^{1/n}$	(8.82, 10.36, 12.13)			

681

682

683

684

685

686

687

688

689

690

691

Table 3. Grades and ranking of choices

692

Rank	(CL) final grade	(-D) distance to negative ideal	(+D) distance to positive ideal	Scenario
7	0.258	0.238	0.685	scenario 1
4	0.460	0.497	0.583	scenario 2
1	0.502	0.561	0.556	scenario 3
5	0.499	0.483	0.593	scenario 4
3	0.461	0.499	0.582	scenario 5
6	0.350	0.370	0.688	scenario 6
2	0.496	0.550	0.559	scenario 7
8	0.232	0.212	0.702	scenario 8

693

694

695

696

697

698

699

700

701

702

703