The Adopting of Markov Analysis to Forecast the Operations Competitive Advantages of Mobile Phone Service Providers: The Case of Jordan*

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ABSTRACT

The aim of this paper is to adopt the Markov analysis to forecast the operations competitive advantages of mobile phone service providers in Jordan. Three service providers were investigated. The secondary data of each service provider over the period (2005-2010) was used for the purpose of study. The Markov analysis was used to develop the series of forecasted competitive position index for each service provider, and then regression analysis was used to forecast the changes in operations competitive positions. The result showed that; the competitive position leader service provider which is Zain will be improved in term of network coverage, cost of calls services and network accessibility. But the follower (Orange) competitive position will be improved in term of cost of calls services, number of basic and entertainment services. The laggard (Umniah) competitive position will be deteriorated over time. This is the first study which adopts Markov analysis to forecast the operations competitive position. The managers of the corporations in Jordan have a clear insight about their future competitive position. The leader and follower can sustain their position, but the laggard should make further development in order to avoid the deterioration of its position. The scholar can benefit from the methodology of this paper to adopt Markov analysis to forecast the operations competitive position.

Keywords: *markov analysis, operations, competitive advantage, service provider, mobile telecommunication, Jordan*

1. INTRODUCTION

The operations strategy is one of the milestone topics of operations management. The research contribution of operations strategy is classified to process, content and context. The majority of research contribution is concentrated on reporting the operations competitive priorities (e.g. Wheelwright, 1984; Hill, 1995; Ward et al., 1996; Lee et al., 2007; Leseure, 2010; Paiva and Vieira, 2011). Reporting the forecasted operations competitive advantages is very important since the operations are the milestone for any organizations. Operations are responsible about delivering the finished products (good or services) to customers.

The competitive advantages have been investigated by the strategic management literature, the majority of previous studies of strategic management have developed conceptual models of competitive advantages (e.g. Passemard and

Kleiner, 2000; Beheshti, 2004; O'Shannassy, 2008; Javalgi, et al., 2011), and very limited studies have reported the practices of particular cases (e.g. Du, 2007; Hua et al., 2011). The empirical research contribution of competitive advantages in general and operations competitive advantages in particular is very limited. No previous study has adopted the Markov analysis to forecast the operations competitive advantages in general and mobile service providers competitive advantages in particular. The majority of previous studies of Markov analysis have focused on modeling the financial returns, students' enrollment at universities, and market share.

Reporting the sustained operations competitive advantages of mobile service providers is very important. This sector faces a strong competition especially in the Middle East region in general and Jordan in a particular. It is attractive to investigate the practices of mobile phone service providers in developing countries in general and particularly the practices of service providers in the Middle East region. The growth of this industry in developing economies is significantly more than developed countries. The developed countries growth is in a saturation stage. The Arab states region is the third ranked after Europe and the USA in terms of growth during 2009 to 2010 which reached 75% (International Telecommunication Union, 2010).

Jordan is a country located in the Middle East region. It a constitutional monarchy with a representative government.

The Jordan mobile market is characterized by a high competition between three mobile operators Zain, orange and Umniah. The leader and the first mover is the Zain. Which entered the market in 1996, followed by Orange in 2001 and the last entrant is Umniah, which entered the market in 2005.

The contribution of information and communication sector in GDP is 14% (Information Technology Association-Jordan, 2011). Jordan is the first country in the Middle and East and North Africa which liberalized its telecommunication sector (The Royal Bank of Scotland, 2011). The growth of mobile market in Jordan is about 7.1% annually, the penetration of 114%, and this sector is expected to continue growing the next years (Business Monitor International, 2011).

This study will adopt Markov analysis to forecast the changes in operations competitive advantages for one of the leading sectors in Jordan. This study will bridge the literature gap and adopt a new methodology to forecast the competitive

advantages. To realize this aim the following objectives were realized;

1. Identifying and defining the operations competitive capabilities of mobile phone service providers.
2. Developing the competitive position index of each service provider during the first period (2005) and second period (2010).
3. Developing the vector of competitive position probabilities of each service provider during the first period (2005).
4. Developing the matrix of transition probabilities for the competitive position of each service provider over the period (2005-2010).
5. Forecast the operational competitive position for each service provider according to each operations competitive capability over the period (2012-2031).

This paper is issued in five sections. The first one is the literature review, followed by the methodology section, then, data analysis and findings, the next section is the discussion, finally the conclusion, limitations, applications and future researches were presented.

2. LITERATURE REVIEW

2.1 Markov Analysis

It is a stochastic technique which is used to determine the future state of a particular phenomenon based on numerical calculations. It depends on probability of mutual impact over time (Mehmood and Lu, 2011). The first model was developed by Wienner in 1939 and 1940s. This model is widely used by social sciences to analyze the behavior of data panel. The applications in business are focused on brand switching, market structure and financial analysis. This model could be classified to single Markov chain (M) model, latent class (LC) models and Mixed of both which is called mixed Markov latent class Model (MMLC) (Aaltonen and Ostermark, 1998).

Building Markov forecasting model to predict the state of an object in a certain period of time in the future is the main principle of using Markov chain. Moreover, Markov chain prediction method is only a probability forecasting methods and the predicted results are expressed as a probability of a specific state in the future (Zhang & Zhang, 2009).

In this technique, two states are assumed which are *mutually exclusive* and *collectively exhaustive*. Collectively exhaustive is a system in which all of the possible states can be listed. Mutually exclusive is a system that can be presented in only one state at any point in time. A matrix that containing all transition probabilities for a certain system is called Matrix of Transition Probabilities (Render, 2012).

The previous studies have focused on adopting Markov analysis to model financial returns (e.g. Aaltonen Ostermark, 1998; Chang, 2006), to model the controlling of maintenance management (e.g. Jin, et al., 2005), to forecast the future enrollment of students (e.g. Nyandwaki, et al. 2014), to forecast the future market share (e.g. Uslu et al., 2014), and energy demand (e.g. Kazemi et al., 2011). The previous studies have not adopted the Markov analysis to forecast the changes in operations competitive advantages for mobile phone service providers industry. Accordingly, this study will bridge this gap by adopting the Markov analysis principle.

2.2 The Operations Competitive Advantages of Mobile Phone Service Providers

The competitive advantage is one of the important concept in the strategic management literature. This concept had been discussed by numerous scholars of strategic management. There was a debate between scholars of strategic management about the proper definition of this concept. In the context of this research the competitive advantages are the consequences of strategic actions adopted by the organization. These advantages should be tangible on behalf of customers. The competitive advantages should be formulated on the product or services attributes in order to be recognized by customers.

The operations literature which discussed these attributes is the operations strategy literature. These attributes are titled as operations competitive capabilities, which are the realized operations competitive priorities. These capabilities could be classified to speed, cost, flexibility and quality (Skinner, 1969; Hill, 1995). The classification of these capabilities in the mobile service providers' operations strategy literature is proposed by Lee et al. (2006) and Migdadi (2012). These are reducing the prices, improving the service quality (service availability), billing system, range of service provided the offers.

The previous studies of operations strategy literature have focused mainly on reporting the manufacturing competitive priorities (e.g. Skinner, 1969, 1974; Wheelwright, 1984; Hill, 1995; Ward et al., 1996; Lee et al., 2007; Leseure, 2010; Paiva and Vieira, 2011). Further, these studies have not investigated the proposed future changes in the operations competitive capabilities. The majority of these studies are snap shot studies. Only one study has investigated the order winner operations strategy of mobile service providers (e.g. Migdadi, 2012). This study has focused on reporting the past practices of the leader, follower and laggard service providers over an extended period of time. This study did not investigate the future changes in the operations competitive advantages.

Table 1 The Sources of Competitive Capabilities And The Scales

Source of competitive capabilities	Scale
Network coverage	Percentage of population covered
Diversity of offers	Number of offers
Cost of calls service	Calls rate per minute
Diversity of basic services	Number of basic services
Diversity of entertainment services	Number of entertainment services
Network accessibility	Percentage of unreachable calls

Source: Migdadi, 2012

Table 2 Example (1) How to Compute The Competitive Position Index Of Orange Network Coverage

Service provider	Network coverage (2005)	Competitive position index
Zain	85%	85% / 90% = 0.94
Orange	90%	90% / 90% = 1
Umniah	66%	66% / 90% = 0.73
Best score	90%	

Table 3 Example (3) How to Find the Transition Probability of Competitive Position

Service provider	Probability of competitive position in 2005	Probability of competitive position in 2011	Difference (the transaction in probability of competitive position)
Zain	0.35	0.37	0.02
Orange	0.37	0.36	-0.01
umniah	0.27	0.25	-0.02

The previous studies of strategic management have investigated the competitive advantages in general. The majority of the strategic management literature have focused on building conceptual models by using literature (e.g. Passemard and Kleiner, 2000; Beheshti, 2004; O'Shannassy, 2008; Javalgi, et al., 2011). Or investigating particular cases (e.g. Du, 2007; Hua et al., 2011). With limited concern about surveying a particular industry (e.g. Felzensztein and Gimmon, 2014) also the empirical studies are snap shot studies.

3. METHODOLOGY

The methodology of study passed through different stages as presented in **Figure 1**, each stage includes different steps. In the following sections are the details.

3.1 Phase 1: Identifying and Defining the Operations Competitive Capabilities of Mobile Phone Service Providers

The sources of operations competitive capabilities investigated in this study are very close to those recommended by Migdadi (2012) which are summarized in **Table 1**. The data was adopted from Migdadi (2012). Please see appendix (A).

3.2 Phase 2: Developing the Competitive Position Index of Each Service Provider during the First Period (2005)

The competitive position index is the relative performance index of each service provider in comparison with best competitors during the first period (2005). The performance indicators are the operations competitive capabilities. The competitive position index was developed for each service provider's competitive capability. The following procedures were followed for this purpose:

Step 1: the scores of each service provider's operations capabilities during the first period (2005) were identified.

The source of these scores is Migdadi (2012). The scores are presented in Appendix (A).

Step 2: identifying the best score realized by service providers under each competitive capability.

Step 3: the competitive capability score of each service provider was divided by the performance of the best score, if the capability higher score is the best. Or the best score was divided by the realized score of each service provider, if the capability lower score is the best (this is in the case of cost per minutes of call). See the example presented in **Table 2**.

3.3 Phase 3: Developing the Vector of Competitive Position Probabilities of Each Service Provider during the First Period

Step 1: Compute the competitive position index for each service provider (the same as discussed in phase 2).

Step 2: Computing the probability of competitive position of each service provider. This was made by summing the competitive position indices of all service providers, then divide the competitive position index score of each service provider by the total. See the following example

Example (2): how to develop the vector of competitive position probability

a. Summing the indices: 0.94+1+0.73= 2.67
b. Compute the probability:
Zain: 0.94/2.67= 0.35   Orange: 1/2.67=0.37
Umniah= 0.73/2.67= 0.27

Step 3: Finally the results were placed into a victor of competitive position probability as presented below.

Zain	Orange	Umniah
(0.35	0.37	0.28)

3.4 Phase 4: Developing the Matrix of Transition Probabilities for the Competitive Position of Each Service Provider

Step 1: compute the probability of competitive position for each service provider over the first period (2005) and second period (2010) as discussed in section (3.3).

Step 2: find the differences between the probabilities of each service provider over the periods. This represents the probabilities of transitions. See the example presented in **Table 3**.

Step 3: if the transition probabilities is negative the competitive position of service provider is deteriorated, so the whole probability which is (1) will be reduced by the amount of deterioration, and this deterioration represents an improvement in competitive position of other service providers' probabilities. For more details about all matrices of transition competitive position probability see Appendix (B).

Example (4): The Matrix of Transition Probabilities

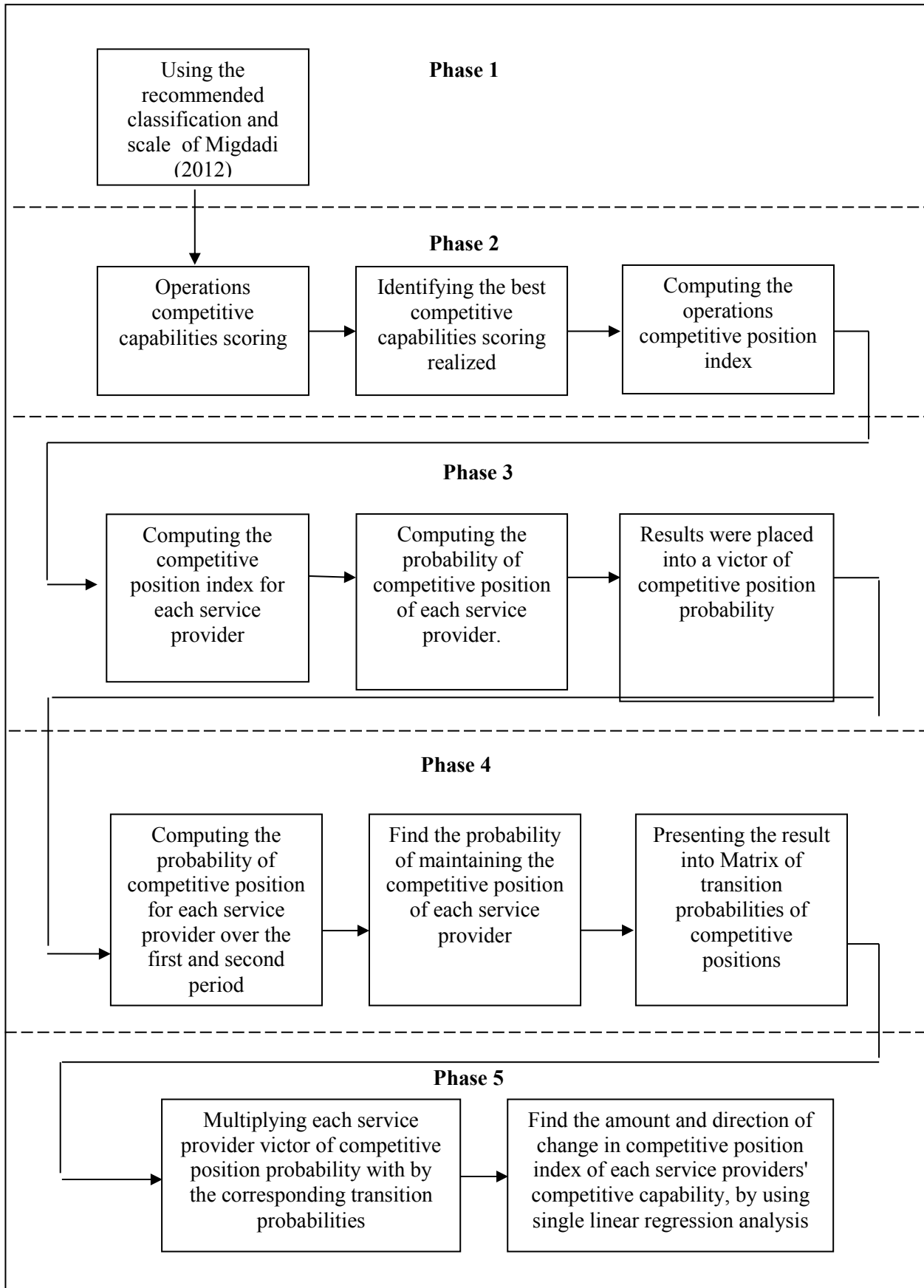| Zain	Orange	Umniah
1	0	0
0.0046	0.9954	0
0.0153	0	0.9847

Figure 1 The Flow Chart of Study

Example (5): How to Compute the Competitive Position Index According to Network Accessibility

			Zain	Orange	Umniah
Zain	Orange	Umniah	1	0	0
(0.35	0.37	0.28)	0.0046	0.9954	0
			0.0153	0	0.9847

Zain competitive position over the first period= (0.35*1)+ (0.37*0.0046)+(0.28*0.0153)= 0.36
Orange competitive position over the first period= (0.35*0)+ (0.37*0.9954)+(0.28*0)=0.3
Umniah competitive position over the first period= (0.35*0)+ (0.37*0.0)+(0.28*0.9847)= 0.28

3.5 Phase 5: Forecast the Operational Competitive Position for Each Service Provider According to Each Operations Competitive Capability

Step 1: each service provider victor of competitive position probability was multiplied by the corresponding transition probabilities. This action was repeated 20 times since the period of investigation was extended over the period (2011-2031).

Step 2: Then, in order to find the amount and direction of change in competitive position index of each service providers' competitive capability, single linear regression analysis was used for this purpose.

4. DATA ANALYSIS AND FINDINGS

This section represents the results of linear regression analysis to identify the operations competitive advantages. The following sections are the results related to each service provider.

4.1 The Operations Competitive Advantages of Zain Corporation

Figure 2 shows the changes in the probability of competitive advantage of Zain Corporation over time. It can be seen that; the competitive position of Zain Corporation in term of network coverage, cost of calls services and network accessibility are improved over time. However, the competitive position of Zain Corporation in term of diversity of offers, diversity of entertainment service will be deteriorated over time, but the competitive position of diversity of basic services will not change over time. **Table 4** shows the computed probabilities of competitive advantages over time and result of linear regression analysis, it can be seen that; the probability of competitive position of network accessibility will reach 0.47 in 2031, however, the probability of competitive position of calls rate per minute will reach 0.71 in 2031. The competitive position index of network accessibility will reach 0.25 in 2031. The probability of number of offers, number of entertainment services will be deteriorated to reach 0.18 and 0.21 in 2031 respectively. The corporation is expected to maintain its position without change in term of basic services.

Linear regression analysis result reports the average change in the probability of competitive position. It can be seen that in **Table 4**; the coefficient of linear regression models represents such change, the average probability change in network coverage, cost if calls services and service accessibility is positive, the change is 0.005, 0.24 and 0.0012 respectively, so the probability of competitive positions will be improved. The average probability change in term of number of offers and number of entertainment services is negative; the change is -0.009, and -0.004 respectively, so the probability of competitive position will be deteriorated.
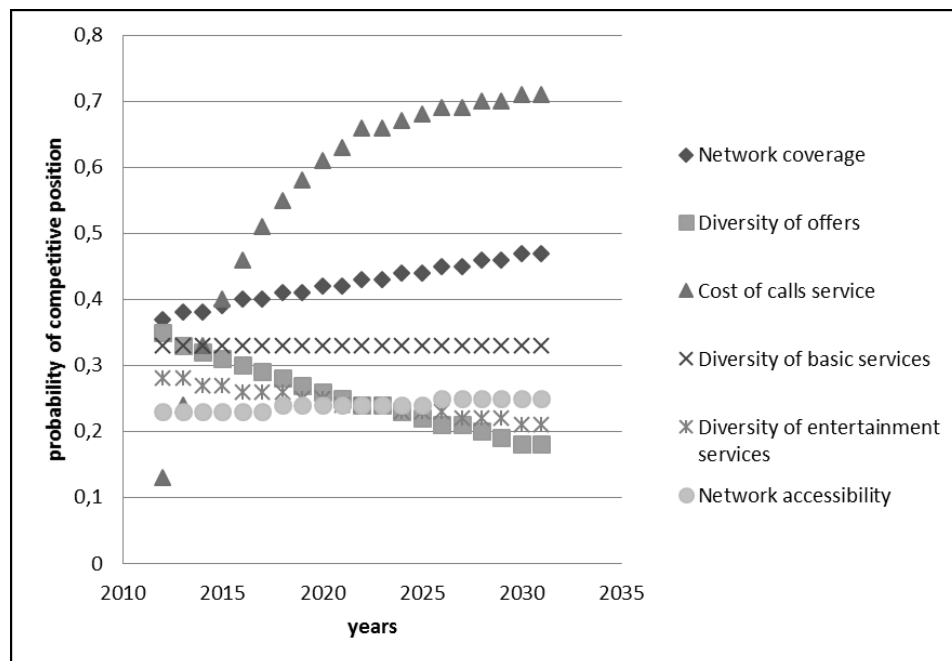

Figure 2 The scatter diagram for the changes in the probability of Zain Corporation's operations competitive position over time period (2012-2031)

Table 4 The Analysis of Zain Corporation's Operations Competitive Advantages

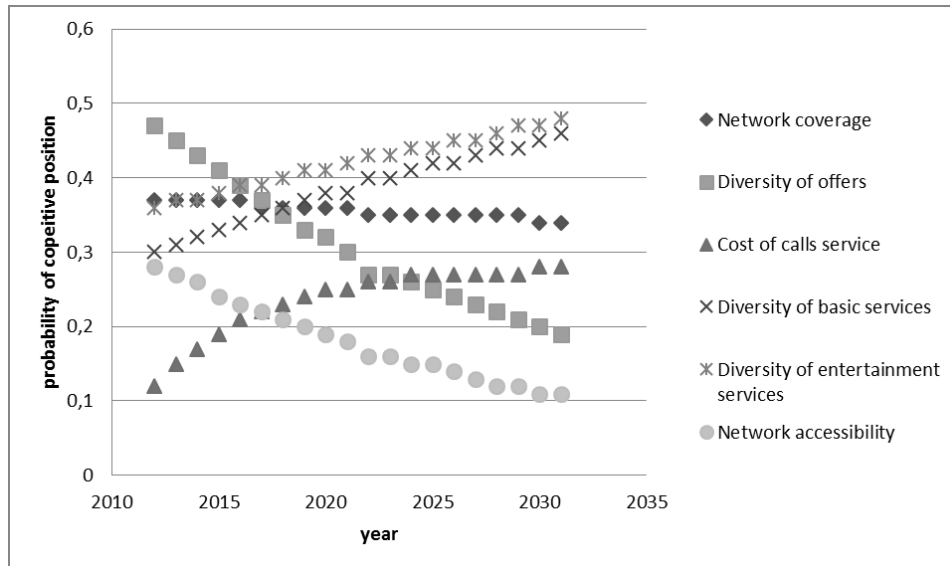| Year	Network coverage	Diversity of offers	Cost of calls service	Diversity of basic services	Diversity of entertainment services	Network accessibility
2012	0.37	0.35	0.13	0.33	0.28	0.23
2013	0.38	0.33	0.24	0.33	0.28	0.23
2014	0.38	0.32	0.33	0.33	0.27	0.23
2015	0.39	0.31	0.40	0.33	0.27	0.23
2016	0.40	0.30	0.46	0.33	0.26	0.23
2017	0.40	0.29	0.51	0.33	0.26	0.23
2018	0.41	0.28	0.55	0.33	0.26	0.24
2019	0.41	0.27	0.58	0.33	0.25	0.24
2020	0.42	0.26	0.61	0.33	0.25	0.24
2021	0.42	0.25	0.63	0.33	0.24	0.24
2022	0.43	0.24	0.66	0.33	0.24	0.24
2023	0.43	0.24	0.66	0.33	0.24	0.24
2024	0.44	0.23	0.67	0.33	0.23	0.24
2025	0.44	0.22	0.68	0.33	0.23	0.24
2026	0.45	0.21	0.69	0.33	0.23	0.25
2027	0.45	0.21	0.69	0.33	0.22	0.25
2028	0.46	0.20	0.70	0.33	0.22	0.25
2029	0.46	0.19	0.70	0.33	0.22	0.25
2030	0.47	0.18	0.71	0.33	0.21	0.25
2031	0.47	0.18	0.71	0.33	0.21	0.25
Linear regression analysis for the impact of time on the probability of competitive position						
R^2	0.99	0.99	0.88	1.00	0.99	0.98
F-value	6140.76**	1626.73**	66.81**	0.00**	5183**	856.4**
P-value	0.000	0.000	0.000	0.00	0.000	0.000
Intercept	10.32**	17.8**	-48.23**	0.33**	7.74**	-2.21**
t-value	-75.62	40.81	-8.07	0.001	74.3	-26.40
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Coefficient	0.005**	-0.009**	0.24**	0	-0.004**	0.0012**
t-value	78.36	-40.33	8.17	0	-71.99	29.27
P-value	0.000	0.000	0.000	1	0.000	0.000

**P-value$\leq$0.01

4.2 The Operations Competitive Advantages of Orange Corporation

Figure 3 shows the changes in the probability of competitive advantage of Orange Corporation over time. It can be seen that; the probability of competitive position of Orange Corporation in term of cost of calls services, number of basic services and number of entertainment services will be improved over time. However, the probability of competitive position of Orange Corporation in term of network coverage, diversity of offers, and network accessibility will be deteriorated over time. **Table 5** shows the computed probabilities of competitive advantages over time and result of linear regression analysis, it can be seen that; the probability of competitive position of calls rate per minute will reach 0.28 in 2031. The probability of competitive position index of basics services will reach 0.46

in 2031. The probability of competitive position index of number of entertainment services will reach 0.48 in 2031. The probability of network coverage, number of offers, and network accessibility will be deteriorated to reach 0.34, 0.19 and 0.11 in 2031 respectively.

Linear regression analysis result reports the average change in the probability of competitive position. It can be seen that in **Table 5**; the coefficient of linear regression models represents such change, the average probability of change in cost of calls services, number of basic services and number of entertainment services is positive, the change is 0.006, 0.0083 and 0.006 respectively, so the probability of competitive positions will be improved. The average probability change in term of network coverage, number of offers and network accessibility is negative, the change is -0.0016, -0.014 and – 0.061 respectively, so the probability of competitive position will be deteriorated.

Figure 3 The Scatter Diagram for the Changes in the Probability of Orange Corporation's Operations Competitive Position over Time Period (2012-2031)

Table 5 The Analysis of Orange Corporation's Operations Competitive Advantages

Year	Network coverage	Diversity of offers	Cost of calls service	Diversity of basic services	Diversity of entertainment services	Network accessibility
2012	0.37	0.47	0.12	0.30	0.36	0.28
2013	0.37	0.45	0.15	0.31	0.37	0.27
2014	0.37	0.43	0.17	0.32	0.37	0.26
2015	0.37	0.41	0.19	0.33	0.38	0.24
2016	0.37	0.39	0.21	0.34	0.39	0.23
2017	0.36	0.37	0.22	0.35	0.39	0.22
2018	0.36	0.35	0.23	0.36	0.40	0.21
2019	0.36	0.33	0.24	0.37	0.41	0.20
2020	0.36	0.32	0.25	0.38	0.41	0.19
2021	0.36	0.30	0.25	0.38	0.42	0.18
2022	0.35	0.27	0.26	0.40	0.43	0.16
2023	0.35	0.27	0.26	0.40	0.43	0.16
2024	0.35	0.26	0.27	0.41	0.44	0.15
2025	0.35	0.25	0.27	0.42	0.44	0.15
2026	0.35	0.24	0.27	0.42	0.45	0.14
2027	0.35	0.23	0.27	0.43	0.45	0.13
2028	0.35	0.22	0.27	0.44	0.46	0.12
2029	0.35	0.21	0.27	0.44	0.47	0.12
2030	0.34	0.20	0.28	0.45	0.47	0.11
2031	0.34	0.19	0.28	0.46	0.48	0.11
Linear regression analysis for the impact of time on the probability of competitive position						
R^2	0.99	0.99	0.88	0.99	0.99	0.99
F-value	16102.3**	930.51**	66.81**	2079.57**	6625**	856.45**
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Intercept	3.7**	29.4**	-12.89**	-16.45**	-11.88**	18.19**
t-value	111.2	30.82	-8.02	-44.5	-78.59	29.55
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Coefficient	-0.0016**	-0.0144**	0.006**	0.0083**	0.006**	-0.0609**
t-value	-100.512	-30.501	8.17	45.602	81.40	-29.26
P-value	0.000	0.000	0.000	0.000	0.000	0.000

**P-value$\leq$0.01

4.3 The Operations Competitive Advantages of Umniah Corporation

Figure 4 shows the change in probability of competitive advantages analysis of Umniah Corporation. It can be seen that; the probability of competitive position of Umniah Corporation in term of all operations competitive capabilities will be deteriorated overtime. **Table 6** shows the computed probabilities of competitive advantages over time and result of linear regression analysis, it can be seen that; the probability of competitive position index will reach 0.01 for network coverage, diversity of entertainment services in 2031. The probability of competitive position index will reach 0.02 for diversity of basic services and network

accessibility in 2031. The probability of competitive position index of diversity of offers and cost of call services will reach 0.03 in 2031.

The competitive position indices over time will be deteriorated as presented by the linear regression analysis results. The change is about -0.0036 (coefficient value) annually for network coverage. The change is about -0.0079 for the network accessories. The change is about -0.0084 (coefficient value) annually for diversity of basic services. The change is about -0.0024 (coefficient value) annually for the diversity of entertainment services. The change is about -0.024 (coefficient value) annually for diversity of offers. The change is about -0.033 for cost of calls services.

Table 6 The Analysis of Umniah Corporation's Operations Competitive Advantages

Year	Network coverage	Diversity of offers	Cost of calls service	Diversity of basic services	Diversity of entertainment services	Network accessibility
2012	0.28	0.58	0.68	0.41	0.32	0.41
2013	0.24	0.49	0.58	0.35	0.27	0.34
2014	0.20	0.42	0.49	0.3	0.23	0.29
2015	0.17	0.36	0.42	0.25	0.2	0.25
2016	0.15	0.3	0.35	0.22	0.17	0.21
2017	0.13	0.26	0.3	0.18	0.14	0.18
2018	0.11	0.22	0.26	0.16	0.12	0.15
2019	0.09	0.19	0.22	0.13	0.10	0.13
2020	0.08	0.16	0.19	0.11	0.09	0.11
2021	0.07	0.13	0.16	0.1	0.07	0.09
2022	0.06	0.11	0.13	0.08	0.06	0.08
2023	0.05	0.1	0.11	0.07	0.05	0.07
2024	0.04	0.08	0.10	0.06	0.05	0.06
2025	0.03	0.07	0.08	0.05	0.04	0.05
2026	0.03	0.06	0.07	0.04	0.03	0.04
2027	0.02	0.05	0.06	0.04	0.03	0.04
2028	0.02	0.04	0.05	0.03	0.02	0.03
2029	0.02	0.04	0.04	0.03	0.02	0.03
2030	0.02	0.03	0.04	0.02	0.02	0.02
2031	0.01	0.03	0.03	0.02	0.01	0.02
Linear regression analysis for the impact of time on the probability of competitive position						
R^2	0.99	0.99	0.89	0.99	0.99	0.99
F-value	4879.6**	1148.24**	69.17**	2073.9**	8643**	876.84**
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Intercept	7.63**	-47.21**	66.27**	17.37**	5.16**	-15.34**
t-value	72.1	-33.57	8.34	46.29	99.45	-28.53
P-value	0.000	0.000	0.000	0.000	0.000	0.000
Coefficient	-0.0036**	-0.024**	-0.033**	-0.0084**	-0.0024**	-0.0079**
t-value	-69.85	-33.88	-8.31	-45.54	-92.96	-29.61
P-value	0.000	0.000	0.00	0.000	0.000	0.000
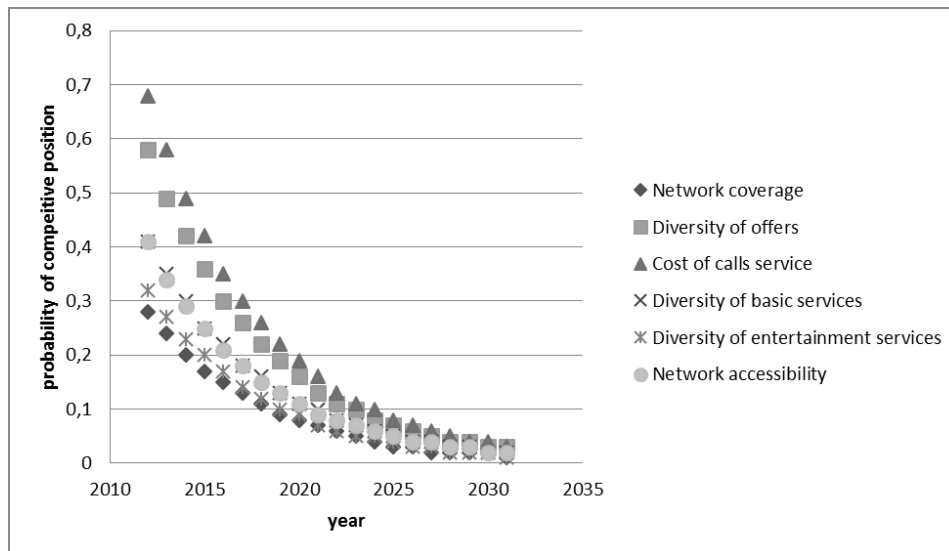
Figure 4 The Scatter Diagram for the Changes in the Probability of Umniah Corporation's Operations Competitive Position over Time Period (2012-2031)

5. DISCUSSION

The combinations of operations competitive advantages that will be improved for Zain differ from Orange. This indicates that; each service provider should have different sources of competitive advantages over time in order to have a position on the market especially for a market faces sever completion like Jordan market.

The time of market entry could justify the results of this study; Zain Corporation was the early mover for the Jordan market, this corporation monopolizes the telecom market in Jordan for about five years. In general the early movers are expected to occupy the best position over time. The next service provider entered the market after Zain was Orange and the last service provider entered the market was Umnaih after five years of Orange corporation entry. So the late entrant is expected to face worse competitive position in comparison with the second mover.

The improved operations competitive advantages over time of Zain were network coverage, cost of calls services and network accessibility. This result is logical since the early mover are already invest heavily in the assets to attract more subscribers and reduce the cost per base station, further, Jordan is a small country so the early movers will gain the benefit (Migdadi, 2012). However, the improved operations competitive advantages over time of Orange were; cost of calls services, number of basic services and number of entertainment services. This result is logical, if the service provider have not such advantages of early mover it should differentiate itself by launching more services, whether basic or entertainment, one other hand, the shared improved advantage between both service providers is cost, since customers in Jordan the same as customers in other developing economies are attracted by cost (Migdadi, 2012).

6. CONCLUSION
6.1 Contribution and Result

The previous studies of operations strategy have focused on mainly on reporting the operations competitive priorities. The operations competitive advantages have not been reported by the previous studies of operations strategy.

The competitive advantages have been studied by the strategic management literature, the focus of the previous studies was on developing conceptual models or investigating particular cases. The previous studies of Markov analysis have not reported the operations competitive advantages. The studies have focused on modeling financial returns, students' enrollment, and market share. This study is the first study which used the Markov analysis to forecast the operations competitive advantages of mobile service providers.

The main result of this study is that the competitive position leader service provider which is Zain will be improved in term of network coverage, cost of calls services and network accessibility. But the follower (Orange) competitive position will be improved in term of cost of calls services, number of basic and entertainment services. The laggard (Umniah) competitive position will be deteriorated over time.

6.2 Implications, Limitations and Future Researches

This study developed a methodology to adopt Markov analysis to forecast the operations competitive advantages. This methodology could be adopted by future scholar in the same or other industries. This study helps the operations managers at mobile phone service providers in Jordan to take proactive actions to improve their positions and avoid deterioration especially for the laggard. The new entrants for the Jordan market have better insight about the sources of competitive advantages, and the future of this industry. Further, the telecommunication commission in Jordan can benefit from this result in deciding whether to open the market for the new entrants or not. The customers especially the corporate customers have better insight about the most sustained service provider over time to maintain the relationship with him.

This study investigated the practices of limited number of service providers in one country. Further studies could be extended to include other service providers at regional level. This study did not examine the impact of country context on the operations competitive advantages. Also it did not

examine the impact of corporation's characteristics on the operations competitive advantages. Moreover, this study did not examine the impact of operations competitive advantages on the performance of corporations as the realized market share, and profitability.

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APPENDIX A: THE DATA RELATED TO OPERATIONS COMPETITIVE CAPABILITY OF MOBILE PHONE SERVICE PROVIDERS IN JORDAN (SOURCE: MIGDADI, 2012)

Corporation	Network coverage	Diversity of offers	Cost of calls service	Diversity of basic services	Diversity of entertainment services	Network accessibility
Zain (2005)	85%	17	4.07	9	7	18%
Zain (2011)	98%	20	1.88	10	9	15%
Orange (2005)	90%	23	4.32	8	9	22.5%
Orange (2011)	97%	27	3.25	8	13	15%
Umniah (2005)	66%	9	0.68	10	9	39.1%
Uminah (2011)	68%	17	0.91	12	12	34.4%

APPENDIX B: THE VECTORS OF COMPETITIVE POSITION PROBABILITIES AND MATRICES OF TRANSITION PROBABILITIES

Appendix (B-1) network coverage

			Zain	Orange	Umniah
Zain	Orange	Umniah	1	0	0
(0.36	0.36	0.28)	0.005	0.995	0
			0.02	0	0.98

Appendix (B-2) diversity of offers

			Zain	Orange	Umniah
Zain	Orange	Umniah	0.97	0	0.03
(0.35	0.47	0.18)	0	0.95	0.05
			0	0	1

Appendix (B-3) calls rate per minute

			Zain	Orange	Umniah
Zain	Orange	Umniah	1	0	0
(0.13	0.12	0.76)	0	1	0
			0.15	0.04	0.81

Appendix (B-4) number of basic services

			Zain	Orange	Umniah
Zain	Orange	Umniah	1	0	0
(0.33	0.30	0.37)	0	1	0
			0	0.03	0.97

Appendix (B-5) network coverage

			Zain	Orange	Umniah
Zain	Orange	Umniah	1	0	0
(0.23	0.28	0.49)	0.007	0.95	0.043
			0	0	1

Appendix (B-6) number of entertainment services

			Zain	Orange	Umniah
Zain	Orange	Umniah	0.98	0.02	0
(0.28	0.36	0.36)	0	1	0
			0	0.007	0.993

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