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Proposing a pharmaceutical brand naming framework based on techniques extracted from decoding current drug names

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***Abstract*---**This study endeavors to make a valuable contribution to the brand naming theory especially in the pharmaceutical field. It sheds light on several techniques used by companies to name their drugs as per the regulations and trends in the market. The objective of this study is to build an applicable brand naming framework after exploring techniques that are used to generate and invent pharmaceutical brand names. An exploratory qualitative study is conducted using official public data from the Jordan National Drug Formulary (JNDF) in Jordan. A simple four-step process is outlined to decode the drugs' brand naming techniques: (1) Select, (2) Analyze, (3) Extract, and (4) Suggest. A deep componential analysis of 57 drug brand names has been carried out for each component of the drug name by finding linkages between the syllables and relevant parts in the generic name, chemical name, company name, and/or otherwise. The researchers then extracted number of techniques that are used by pharmaceutical companies. These techniques were translated into an adaptive framework which proposes different variables under which drug brand names can be classified. In the proposed framework, three major drug brand naming techniques were categorized: the disease related, the company related, and/or the invented / Unrelated) name; additional to the fact that the generic and chemical names are constant names for any new drug. The result is an attempt to enhance drug brand naming literature and to introduce techniques and guidelines for the pharmaceutical market grounded on real examples and practices

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1. Introduction

In every healthcare system, the role of the pharmaceutical industry is extremely significant; however, pharmaceutical industries worldwide are subjected to different rules and practices. This is because each country has its own recourses, regulations and markets. According to the annual World Preview Report 2016, the global growth rate for the pharmaceutical industry is 6.3% and the global pharmaceutical market is expected to exceed $1.12 trillion in 2022.[1] In the face of these explosive developments, one of the primary challenges facing pharmaceutical industries is to proliferate the market with new and, yet, recognizable drugs. In the past decade, creating names for drugs has become a business in itself.[2] Therefore, brand management is vital to transforming pharmaceutical companies and leading them towards growth and success.[3,4]

Globalization increases the necessity for simple usage across different languages. However, a distinction should be made between the name-crafting process of pharmaceutical brands and other general brands. Drug companies struggle to craft powerful and unique brand names since a "well-chosen pharmaceutical brand name has high recognition and facilitates higher recall by doctors pharmacists and consumers" (Arora et al, 2015). A given drug typically has three names; a chemical name, a generic name, and a brand name. Each name has its constraints and regulations since the target for each is different.

Generally, various criteria (such as memorability, likeability, meaningfulness, transferability, adaptability, and protectability[4]) should be considered when choosing a brand name for the final consumer products, In the context of pharmaceutical naming; establishing brand names will not likely be in accordance with customer-based selection. It is a very complicated process that needs extensive understanding and skills. Pharmaceutical companies have to adhere to strict regulations and are governed by legal and ethical criteria, chemical structures, and competition considerations. Due to these constraints, building a drug's brand name becomes even more challenging and extremely important and requires careful attention (Arora et al , 2015).

To the best of the authors' knowledge; very little is known about the pharmaceutical companies' ways and techniques that are used in building drugs brand names. We empirically shed light on these methods and techniques through semantic and linguistic insightful analysis of numerous drugs brand names. Consequently, proposing a framework to illustrate potential drugs brand naming classifications that can help to gain an applicable knowledge for scholars and practitioners.

This study aims to achieve the following:

- Understand how pharmaceutical companies create and establish their drugs' brand names.
- Extract methods and techniques for generating and inventing meaningful names in this field.
- Propose an adaptive framework that classifies and abstracts the common drug naming techniques to fill the gaps in the brand naming literature.

Towards this end; a brief background is introduced in section 2, followed by an explanation of study approach and an analysis and results of 57 drugs brand names in section 3. In section 4 an Adaptive Framework for Inventing Drug Brand-Name proposed and presented. Finally, conclusions, Limitations and future work are presented in section 5 and 6.

2. Research Background

The Pharmaceutical Industry in Jordan

Jordan is a small country located in the Middle East with inadequate natural resources. Based on statistics from the International Monetary Fund's World Economic Outlook Database, Jordan's total Gross Domestic Product amounted to $86.19 billion in 2016 (WEO, 2016). Exports represent an estimated 8.7% of total Jordanian economic output. The main export commodities of Jordan are clothing, phosphates, fertilizers, potash, vegetables, manufactured goods, and pharmaceuticals (WEO, 2016). Jordanian pharmaceuticals was ranked as the third-fastest gain in value up by 14.1%. During 2016, pharmaceuticals export volume upraised revenue to $719.5 million and accounted for 9.6% of the overall exports from Jordan. This ranks Jordan first among Arab countries.

Jordan's pharmaceutical sector is regulated by the Ministry of Health (MoH), supervised by the Jordanian Food and Drug Association (JFDA) and governed by local regulations and standards that are compatible with international standards.

The pharmaceutical industry in Jordan harbors 17 pharmaceutical manufacturing companies (Haqaish et al., 2017). Due to their high quality, good reputation and affordable prices (JKB, 2012), these companies export their products to more than 60 countries including the EU market, It is an export-driven sector, where 75% of the local pharmaceutical products are manufactured to be exported mainly to Arab countries that account for more than 80% of the total pharmaceutical exports. Among these countries are Saudi Arabia, Algeria and Iraq (Haqaish et al., 2017).

Brand Naming

Brand name selection is a multi-criteria process, and requires applicable and strict screening (Hsu & Lin, 2013). This process has been addressed from different angels in the marketing literature like: brand name creation, meaning, sound, connotation, spelling, syllables, associations, cultural indications, extension strategies, and others. The linguistic components of a brand name are important for brand transferability (Kum *et al.*, 2011), whereas the sound of a brand name can convey meaning (Shrum & Lowrey, 2007). Carnevale *et al.* (2017) suggested that language, spelling and syllables influence the way consumers

interact with brands. Furthermore, Gupta *et al.* (2018) highlighted that cultural, political, social and environmental aspects that could influence branding.

Pharmaceutical brands

Pharmaceutical brands are different from other brands. Drug companies struggle to craft powerful, unique names that will affect physicians and patients. Drugs generally have three names; a chemical name, a generic name, and a brand name that was created by the proprietor of the drug. The chemical name describes the structure of the drug. It is very complicated and represents the milestone and the foundation of any drug; hence, it is impossible to be used for commercial and general uses. For general uses there is the generic name. Usually, an official body approves generic names which reflect a group of drugs that have similar actions regardless of who made them, how they were prepared, and where they were developed (Gangwal & Gangwal, 2011). Though essential to the pharmaceutical field, this kind of name cannot create life value, competitive advantage, or benefits for companies (Roony, 1995). So, companies resort to have their own brands names. A brand name is established by the company for different generic names or for the same generic name according to the group of products.

However, in today's crowded marketplace, building a drug brand name has become more challenging because of the official regulations and requirements. All drug names should look and sound unique with safety constrains. In addition, some drug manufacturers use computerized algorithmic name originators due to their desire for obtaining quick approval from the official bodies and lack of attentions to the incongruity of the name sound or appearance (Schultz, 2015).

The process for naming a marketable drug involves the following five steps: development of a new chemical entity (NCE); provision of generic naming; creation of brand name; conduction of review by official bodies, and acquisition of final approval.16 (Kenagy & Stein, 2001). Within the highly competitive pharmaceutical markets; choosing strong drug brand name is very important step. Several criteria are used by companies. The brand name should be easy to remember, doesn't look or sound like another drug name or too similar to the generic name, and does not have confusing prefixes or suffixes. The name should not imply a dosage, efficacy, or suggest unapproved indications. Pharmaceutical trade names coined to send a sense of power and tranquility without promising a cure (Ipaktchian, 2005). Additional guidelines call for names to be simple in pronunciation with only one way to say it and have no more than four syllables (Tirrell *et al*, 2015). Consequently, drug names may be odd and unrealistic. The rule is that the drug brand name should never have any meaning (Gangwal & Gangwal, 2011). Drugs names should congruent with the rules of regulatory agencies. For instance, the American Medical Association (AMA)[*] has espoused guidelines that contain some restrictions and rules for naming drugs; for example, companies shouldn't use "Prefixes that indicate 'better,' 'newer,' or 'more effective;' prefixes that evoke the name of the sponsor, dosage form, and duration of action or rate of drug release". Furthermore, it is not acceptable to use "Prefixes that refer to an anatomical connotation or medical condition". Certain letters or sets of letters

[*] https://www.ama-assn.org/united-states-adopted-names-naming-guidelines

include me, str, x, and z also aren't allowed at the beginning of new generic names.

Drug name may convey different messages that are hidden under its letters, vowels and syllables. These messages subliminally indicate the drug's power, quality, innovative, speed and otherwise. X*alk*ori name, is a drug for nonsmokers' lung cancer, has been selected to convey how the drug works. The name formed by taken the gene's letters -*ALK* -and added an *X* before it. According to Fidelino - The director of this company, this name indicates that "With Xalkori" we will target that gene", "We went straight to the science" moreover, drug name may be chosen because of the meaning their sounds imply. Several drugs that regulate heart rhythm end in the suffix -*olol such as* propranolol, atenolol, nadolol, this suffix possesses two echoed syllables that mimic the beating heart (Schultz, 2015). Some may have a Latin root like Cialis, with a meaningful classical root (cael=sky in Latin, which connoting "up" or "above," as in "ceiling.") (Koven, 2012). Moreover, Some Drug names may use letters (P, T or D) to convey power or (X, F, S or Z) to imply speed. (Gangwal & Gangwal, 2011).

3. Research Methodology

An analytical exploratory study is conducted by using official data that are available from the Jordan National Drug Formulary (JNDF) version 2- 2011 ("Jordan National Drug Formulary (JNDF), Version 2, 2011", 2018). JNDF is designed as a general Drug and therapeutic information reference for health care professionals and students in Jordan, and conforms to the Jordanian rational drug policy. To maintain a focus on achieving the first two goals of this study, a simple three-step method was outlined to explore and extract the drugs' brand naming techniques as following:

3.1. Selecting Step

This step is based on a complex selection sequence which includes three interrelated phases: (1) selecting the foundation set which is based on the disease category, (2) selecting the generic name(s) set which is selected from each disease category, followed by selecting (3) the brand name(s) set for each generic name. Based on expert and practitioners opinions that have been collected by a questionnaire, drugs from three different common diseases categories are recommended and selected; (I) Gastrointestinal tract diseases, (II) Nonsteroidal anti-inflammatory drug (NSAID), and (III) Antibiotic used to treat Bacterial infections.

From the first disease category (Gastrointestinal tract diseases), two generic names have been chosen with 16 brand names; Famotidine with 9 brand names, Lansoprazole with 7 brand names. The second disease category (Nonsteroidal anti-inflammatory drug (NSAID)), two generic names have been chosen with 15 brand names; Ibuprofen with 6 brand names, Diclofenac Sodium with 9 brand names.

The third disease category (Antibiotic used to treat Bacterial infections), four generic names have been chosen with 26 brand names; Ciprofloxacin with 11

brand names, Trimethoprim + Sulfamethoxazole with 5 brand names, Cefaclor with 4 brand names and Amoxycillin with 6 brand names. Thereby, a total of 57 brands available in Jordanian market were chosen. Table 1 summarizes the selected brands.

[Insert Table 1 Here]

The detailed list of the selected drug brand names that identify brand name, generic name, and company name grouped according to their categories is shown in the table 2.

[Insert Table 2 Here]

3.2. Analyzing Step

In general, a drug name is composited of syllables and sounds that are derived from related names in the drug family by sharing a common stem as a prefix, infix or suffix. In this step, analyzing the semantic and linguistics of syllables for each drug is conducted by deciphering each brand name to its components. Componential analysis of brand names is taking place for the components of the drug name by finding linkages between the syllables and any related part in the generic name, chemical name, company name, indication and otherwise. The componential analysis details are presented in Table 3 for the first category, Table 4 for the second category, and Table 5 for the third category. The section will continue by discussing some examples from each category to illustrate the techniques used in establishing the brand name of the drug. For example, As shown in table 3, from the first category, Drugs used to treat Gastrointestinal tract diseases, *Acifam* is a brand name that was formed by combining three letters from the word Acid (Aci~~d~~) that is the major cause of Ulcer with three letters from the Generic name (Fam~~otidine~~).

Lansazol is a brand name that was formed by removing selected letters from the Generic name (Lans ~~opr~~ azol ~~e~~). Also, *Lansopral* is a brand name that was formed by having five letters from the Generic name (Lansop ~~razole~~) combined with the first two letters from the company name Ra~~m pharma~~ and *L* as additional character.

Lansotec is a brand name that was formed by using the first five letters from the Generic name (Lanso~~prazole~~) combined with the first three letters from the word Tec~~hnology~~ indicating high quality of the drug. *Takepron* is a brand name that was formed by using the first four letters from the mother company name (Take~~da – APM~~) combined with the first four letters from the word Prot~~on~~ since the drug is a proton pump inhibitor. *Stomax* is a brand name that was formed by combining the first five letters from the scientific name Stoma~~ch~~ which is the organ affected by the disease with an additional letter *X*.

[Insert Table 3 Here]

Table 4 highlights the details of componential analysis for the second category, which is nonsteroidal anti-inflammatory drugs. As seen, from the second category, Nonsteroidal anti-inflammatory drugs, *Balkaprofen* is a brand name that was formed by using the word Balqa' which is one of the governorates of

Jordan combined with the last six letters from the Generic Name ~~Ibu~~profen. Also, *Remofen* is a brand name that was formed by using the first four letters from the word Remo~~ve~~ as the drug removes pain combined with the last three letters from the Generic Name ~~Ibupro~~fen.
Fenbid is a brand name that was formed by using the last three letters from the Generic name ~~Ibupro~~fen combined with three letters from the Latin phrase (Bis in die) which means Twice a day.
Voltaren from the other hand is a brand name is was invented without any relation to the family of the drug or any other related attributes.

[Insert Table 4 Here]

Table 5 indicates the details of componential analysis for the third category, which includes antibiotics used to treat bacterial infections. As seen, Antibiotics used to treat Bacterial infections; *Penamox* is a brand name that was formed by using the first three letters from the generic name pen~~icillin~~ combined with the first four letters from another Generic name Amox~~ycillin~~.
Cloracef is a brand name that was formed by shuffling the letters from the generic name Cefaclor.
Bactall is a brand name that was formed by combining the first four letters from the Word Bact~~eria~~ as it is the cause of the disease with three additional characters (ALL).
Ciproquin is a brand name that was formed by combining the first five letters from the generic name Cipro~~floxacin~~ with the first four letters from the word Quin~~olone~~ which is the family of synthetic broad-spectrum antibiotic drugs.

[Insert Table 5 Here]

3.3. Extracting Step

Based on the componential analysis of the 57 drugs brand names from the Jordanian market, all the brand names were segregated into ten techniques that the pharmaceutical companies rely on for establishing their brand names. The extracted list is as follows: T.1- the root cause of the disease; T.2- generic name of the drug; T.3- company name; T.4- indication (name of the disease); T.5- the location of the factory; T.6- use of Latin root; T.7- chemical name; T.8- organ affected by the disease; T.9- mechanism of drug's action, and; T.10- invented name which are novel names invented specially for the company brand (McCune, 2011) this type offers the most creative latitude for a brand(BRIAN LISCHER) . To complete this step, a mapping process was conducted to match between the extracted techniques and the drugs brand names from the studied sample. This mapping is shown in Table 6. Note that the drug name may be mapped under more than one technique.

[Insert Table 6 Here]

A simple analysis of the derived techniques was conducted via calculating the weight for each technique according to the mapping table above. The weight is the percentage of usage in the studied sample (number of drug names using the techniques/ total number of studied drug names * 100%). The results have been presented in Table 7.

[Insert Table 7 Here]

3.4. Results

The first objective of this study is to explore the drugs brand naming techniques. From the four phase above, the most used techniques were the generic name of the drug, the company name and indication (the name of disease), which were T2, T3 and T4, respectively. Although these techniques were extracted from the Jordanian market, they are matched to the international market as well. For instance, with respect to T.1, Tenofovir is a drug used to treat HIV infection. This name ends with a -vir, which is an antiviral. Here, viral is the cause of the disease. For T.1 and T.2., the example of the brand name Lipitor may be presented. This is the world's largest selling lipid regulator. The name Lipitor is derived from the generic name atorvastatin "tor" and the first three letters from the word lipid, which is the cause of the disease. Additionally, with respect to T.3, a Slovenian company 'Lek' has a paracetamol-based tablet named 'Lekadol', and a Bosnian company 'Bosnalijek' has a paracetamol-based tablet named 'Rhinobos'. For T.4., Vasilip is a drug that uses vas from its generic name 'simvastatin', i as an additional letter, and Lip from the indication Hyperlipidemia. For T.5., Julphamox is a drug name that uses Julph, referring to the 'Gulf area' which is the area of manufacturing and Amox derived from the generic name 'amoxicillin'. For T.6., the drug name Sunovion's Lunesta may be presented as an example. This is a sleep aid which implies the Latin word for the moon Luna.[18] Additionally, 'Xerox' is a brand name that is derived from the Greek root meaning 'dry', where xerostomia is the medical term for dry mouth.[2] For T.7., the example of Hydroquinone is presented. This drug name was derived from the chemical name Quinol. Additionally, cholesterol-lowering drugs that end with –vastatin use the full chemical name. For T.8., Panderm is a drug name derived from the word 'Dermis' which is part of the skin and the organ affected by the disease. Additionally, for T.9., the example of the drug name Xeljanz may be presented. This targets a protein called Janus kinase and works in a different cellular pathway from other arthritis drugs. For this reason, -jan is a part of that name. Lastly, T.10. highlights different drug name brands such as Xalkori, Zelboraf and Yondeli; these are invented names having no clear relation with any of the attributes, yet they are recognizable.

4. An Adaptive Framework for Inventing Drug Brand-Name

Based on our above results, and along with the current literature and practices, the process of Inventing Drug Brand-Name appears to be complicated, lacking a large degree of consistency and having insufficient formal workflow model agreed and validated by the stakeholders. Based on the extracted techniques; it is noticeable that establishing drug brand name is not isolated from its linguistics and semantics relationships.

Generally, there are many criteria that should be considered when choosing a brand name for final consumer products. For instance, Roberston (1989) claimed that a brand name for a product should be distinctive, memorable and should have association with its category. In the context of pharmaceutical naming, establishing brand name mostly will not be in accordance with customer-based

selection. It is a very complicated process that needs extensive, deep understanding and skills.

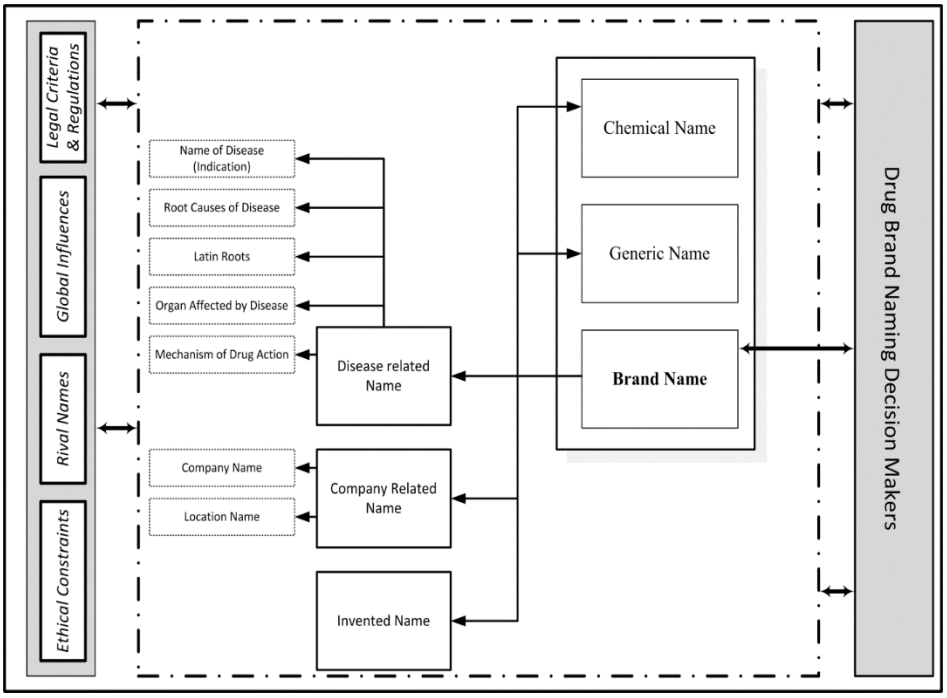

Figure 1. Drug Brand Naming Framework

Consequently, an adaptive framework is needed to enhance brand naming strategy and introduce techniques and methods for the pharmaceutical market that can be used for improving and predicting brand naming decisions. Thus, researchers have created an adaptive framework (depicted in Figure 1) through discovering valid associations and relationships between them. These associations are affected by external and internal constraints. As a matter of fact, there are several dynamic constraints affecting brand naming decisions. Pharmaceutical companies go through strict *external regulations* and legal criteria. Also, they have to consider rival names, disease indications, ethical constrain and other factors. Because of the global nature of pharmaceuticals industry pharmaceutical Companies have legitimate concerns regarding several critical global issues such as: high cost cooperation across borders, cultural and institutional requirements and barriers. Additional to that the complexity of competition represents a serious challenge and threat in which companies should stack up against their respective rivals. Analyze their statistics and strategies to distill branding wisdom and being one step ahead of them. All of which are considered as an external constraints shown on the left side of the framework.

As internal factors, the proposed framework introduces five major sets of current practices for brand naming methods. (1) Chemical related name: This indicates that the drug brand name is associated with the chemical structure of the drug used by chemists and researches. It is long, difficult to pronouns and represents the foundation of any new drug. (2) Generic related name: This indicates that the

drug brand name is associated with group of drugs that have similar actions regardless of who made or develop it. It should be approved from official regulator. (3) Disease related name: which represents five associated sources to create a drug brand name. This set has connection to name of disease, root causes of disease, Latin roots, organ affected by disease and mechanism of drug action. (4) Company related name: which indicates that the drug brand name is associated with names relevant to the company name, location of the company or otherwise. (5) The invented name: that has no associations with chemical, generic, disease and company names.

5. Conclusion

This study was conducted to explore various techniques involved in the creation of brand names for drugs. It was seen that ten main techniques of interest come into play when deciding upon a brand-naming decision within the Jordanian pharmaceutical sector. These were the generic related name, the company related name and the indication related name (name of the disease). Additionally, the cause, name, organ of disease, chemical name of the drug and the location of the company were seen to be significant factors. These extracted techniques lead to propose a framework to enhance branding strategies and introduce relevant guidelines for the pharmaceutical market grounded in real-world applications.

This framework assimilates all the existing techniques that are used in the drugs' brand naming industry. Also, it creates possibility for brand specialists to explore applicable practices in brand naming. These methods are expected to continue to evolve by the pharmaceutical industry with the help of the marketers. However, drug names should be designed by keeping into consideration the factor of cost-effectivity, a suitable balance should be maintained between enhancing company profits and enhancing stockholders' interests.

6. Limitation and future work

The study contains some limitations: first, the study confined to using a relatively small number of drugs brand names from three categories of disease from the Jordanian market. Studies in the future should cover other categories of disease along with their generic names and brand names from one side, and studies should increase the geographic coverage to examine the generalizability of findings from the other side. Second, research may investigate physicians, practitioners, and consumers' attitudes about drugs brand naming techniques to gain better understanding of their perceptions and preferences towards pharmaceutical branding.

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Conflict of Interest

The authors declare no conflict of interest.

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Tables

Table 1: Abbreviations of the selected drugs brand names

	Disease Category	Drug Generic Name	# Brand Name	# Total
i.	**Drugs used to treat Gastrointestinal tract diseases**	Famotidine	9	16
		Lansoprazole	7	
ii.	**Nonsteroidal anti-inflammatory drug (NSAID)**	Ibuprofen	6	15
		Diclofenac Sodium	9	
iii.	**Antibiotic used to treat Bacterial infections**	Ciprofloxacin	11	26
		Trimethoprim + Sulfamethoxazole	5	
		Cefaclor	4	
		Amoxycillin	6	
Total Number of drugs brand names				57

Table 2: A detailed list of the selected drug brand names

NO	**Brand Name**	**Generic Name**	**Company Name**	**Indication**	
1	Acifam	Famotidine	Midpharma	Gastric Ulcer	**I. Drugs used to treat Gastrointestinal tract diseases**
2	Amodine	Famotidine	JPM	Gastric Ulcer	
3	Famodar	Famotidine	Dar Al Dawa	Gastric Ulcer	
4	Famodine	Famotidine	Hikma	Gastric Ulcer	
5	Gastrifam	Famotidine	Hayat	Gastric Ulcer	
6	Peptifam	Famotidine	United	Gastric Ulcer	
7	Stomax	Famotidine	Dawleyh	Gastric Ulcer	
8	Ulceran	Famotidine	Medochemie	Gastric Ulcer	
9	Pepcidine	Famotidine	MSD	Gastric Ulcer	
10	Lansazol	Lansoprazole	Hayat	Gastric Ulcer	
11	Lansomid	Lansoprazole	Midpharma	Gastric Ulcer	
12	Lansopral	Lansoprazole	Ram pharma	Gastric Ulcer	
13	Lanzor	Lansoprazole	Aventis	Gastric Ulcer	
14	Lansotec	Lansoprazole	Joswe	Gastric Ulcer	
15	Lazal	Lansoprazole	JPM	Gastric Ulcer	
16	Takepron	Lansoprazole	Takeda - APM	Gastric Ulcer	
17	Balkaprofen	Ibuprofen	APM	Pain and inflammation	**II. Nonsteroidal anti-inflammatory drug**
18	Brufen	Ibuprofen	KNOLL	Pain and inflammation	
19	Fenbid	Ibuprofen	GSK	Pain and inflammation	
20	Ibugesic	Ibuprofen	Dar Al Dawa	Pain and inflammation	
21	Iburam	Ibuprofen	Ram pharma	Pain and inflammation	
22	Remofen	Ibuprofen	Hikma	Pain and inflammation	
23	Almiral	Diclofenac Sodium	Medochemie	Pain and inflammation	
24	Diclofen	Diclofenac Sodium	United	Pain and inflammation	
25	Diclogesic	Diclofenac Sodium	Dar Al Dawa	Pain and inflammation	
26	Inflaban	Diclofenac Sodium	APM	Pain and inflammation	

27	Olfen	Diclofenac Sodium	Mepha	Pain and inflammation	
28	Rofenac	Diclofenac Sodium	Spimaco	Pain and inflammation	
29	Voldic	Diclofenac Sodium	Dawleyh	Pain and inflammation	
30	Voltaren	Diclofenac Sodium	Novartis	Pain and inflammation	
31	Votrex	Diclofenac Sodium	Hikma	Pain and inflammation	
32	Amoxicent	Amoxycillin	Arab Center	Bacterial Infection	**III. Antibiotics used to treat Bacterial infections**
33	Amoxil	Amoxycillin	GSK	Bacterial Infection	
34	Amoxydar	Amoxycillin	Dar Al Dawa	Bacterial Infection	
35	Moxiram	Amoxycillin	Ram pharma	Bacterial Infection	
36	Penamox	Amoxycillin	Hikma	Bacterial Infection	
37	Ultramox	Amoxycillin	APM	Bacterial Infection	
38	Bactall	Ciprofloxacin	JPM	Bacterial Infection	
39	Cipro	Ciprofloxacin	JOSWE	Bacterial Infection	
40	Ciprobay	Ciprofloxacin	Bayar	Bacterial Infection	
41	Ciprodar	Ciprofloxacin	Dar Al Dawa	Bacterial Infection	
42	Ciproflacin	Ciprofloxacin	Ram pharma	Bacterial Infection	
43	Ciproflox	Ciprofloxacin	APM	Bacterial Infection	
44	Ciprolon	Ciprofloxacin	Hikma	Bacterial Infection	
45	Ciprophar m	Ciprofloxacin	Dawleyh	Bacterial Infection	
46	Ciproquin	Ciprofloxacin	Hayat	Bacterial Infection	
47	Floroxin	Ciprofloxacin	United	Bacterial Infection	
48	Riveroxin	Ciprofloxacin	Joriver	Bacterial Infection	
49	Balkatrin	Trimethoprim + Sulfamethoxazo le	APM	Bacterial Infection	
50	Bactrim	Trimethoprim + Sulfamethoxazo le	Roche	Bacterial Infection	

51	Nortrim	Trimethoprim + Sulfamethoxazole	JPM	Bacterial Infection
52	Trimidar - M	Trimethoprim + Sulfamethoxazole	Dar Al Dawa	Bacterial Infection
53	Trimol	Trimethoprim + Sulfamethoxazole	Julphar	Bacterial Infection
54	Cloracef	Cefaclor	DAD	Bacterial Infection
55	Cefabac	Cefaclor	APM	Bacterial Infection
56	Forticef	Cefaclor	RAM	Bacterial Infection
57	Pharmachlor	Cefaclor	Pharma International	Bacterial Infection

* (All the brand names cited here are owned by respective companies and they are mentioned from view point of publication and not to favor or defame any brand/company or to influence the public/patients'/physicians' choice).

Table 3: Componential analysis for the first category

Generic Name	Brand Name	Company Name	Branding Notes	Indication
Famotidine	Acifam	Midpharma	- **Aci**_– 3 letters from the word **Aci**d that is the major cause of Ulcer. - **Fam -3** letters from the generic name **Fam**otidine)	- Gastric Ulcer. - Duodenal Ulcer. - Peptic Ulcer
	Amodine	JPM	- Removal of selected letters from the Generic name (F**amo**t**idine**)	
	Famodar	Dar Al Dawa	- **Famo** – 4 Letters from the generic name (**Famo**tidine). - **Dar** – from the company name.	
	Famodine	Hikma	- Removal of selected letters from the Generic name (**Famo**t**idin**e)	
	Gastrifam	Hayat	- **Gastri**—6 letters from the scientific name **Gastric** Ulcer (see Indications) - **Fam- 3** letters from the Generic name (**Fam**otidine)	
	Peptifam	United	- **Pepti**- 5 Letters from the scientific name **Peptic** Ulcer	
	Stomax	Dawleyh	- **Stoma-**5 letters from the scientific name **Stomach.** - **X** –additional characters.	
	Ulceran	Medochemie	- **Ulcer**-5 Letters from the scientific name Peptic **Ulcer** - **An**- additional characters.	
	Pepcidine	MSD	- Pep - 3 Letters from the scientific name **Peptic** Ulcer - **cid** - 3 letters from the word Acid that is the major cause of	

			Ulcer. - **Ine** - additional characters.
Lansoprazole	Lansazol	Hayat	- Removal of selected letters from the generic name (**Lans**opr**azol**e)
	Lansomid	Midpharma	- Lanso -5 Letters from the generic name (**Lanso**prazole). - Mid- from the company name: **Mid**pharma
	Lansopral	Ram pharma	- All Letters from the generic name (**Lansop**razole).
	Lanzor	Aventis	- Lanso - 5 Letters from the generic name (**Lanso**prazole). - R - additional character.
	Lansotec	Joswe	- Lanso -5 Letters from the generic name (**Lanso**prazole). - Tec - Additional character
	Lazal	JPM	- Removal of selected letters from the generic name (**La**nsopra**zol**e) and replacing **o** with **a** for better spelling.
	Takepron	Takeda - APM	- Take- from the mother company name: **Take**da. - Pron - from the word **Pro**to**n** (proton pump inhibitor) which is the mechanism of action

Table 4: Componential analysis for the second category

Generic Name	Brand Name	Company Name	Branding Notes	Indication
Ibuprofen	Balkaprofen	APM	- Balka - from the word is **Balqa**' which is one of the governorates of Jordan. It is located northwest of Amman, Jordan's capital. - Profen - 6 Letters from the generic name Ibu**profen**.	- Pain and inflammation in Rheumatic Diseases and other Musculoskeletal Disorders. - Pyrexia. - Analgesic.
	Brufen	KNOLL	- Same generic name spelling with removal and addition of some characters. Ibu**pr**o**o**fen.	
	Fenbid	GSK	- Fen - 3 Letters from the generic name Ibupro**fen**. - Bid - from Latin phrase (**Bi**s in **d**ie) which means Twice a day.	
	Ibugesic	Dar Al Dawa	- Ibu - 3 Letters from the generic name **Ibu**profen. - Gesic - 5 Letters from the scientific name Anal**gesic**. (Indication)	
	Iburam	Ram pharma	- Ibu - 3 Letters from the generic name **Ibu**profen. - Ram - from the company name	
	Remofen	Hikma	- Remo– from the word **Remo**ve (pain killer or remove pain) (Indication) - Fen- 3 Letters from the generic name Ibupro**fen**.	
Diclofenac Sodium	Almiral	Medochemie	- Invented name	
	Diclofen	United	- Diclofen - 8 letters from the Generic Name **Diclofen**ac Sodium	
	Diclogesic	Dar Al Dawa	- Diclo - 5 letters from the generic name **Diclo**fenac Sodium - Gesic - From the Indication word anal**gesic**	
	Inflaban	APM	- Infla - From the Indication word **infla**mmation - Ban -Additional letters	
	Olfen	Mepha	- Rearrangement of 5 letters from the Generic Name Dic**lofen**ac Sodium	
	Rofenac	Spimaco	- R- additional letter - Ofenac - 6 letters from the generic name Dicl**ofenac** Sodium	
	Voldic	Dawleyh	- Vol - Additional Letters - Dic - 3 letters from the generic	

		name **Dic**lofenac Sodium
Voltaren	Novartis	- Invented name
Votrex	Hikma	- Invented name

Table 5: Componential Analysis for the third category

Generic Name	Brand Name	Company Name	Branding Notes
Amoxycillin	Amoxicent	Arab Center	- Amoxi - 4 Letters from the generic name **Amox**ycillin - + (i from the spelling of y 5th letter in the generic name). - Cent- from the company name: Arab **Cent**er.
	Amoxil	GSK	- Removal of selected letters from the Generic name
	Amoxydar	Dar Al Dawa	- Amoxy - 5 Letters from the generic name **Amoxy**cillin - Dar - from the company name: **Dar** Al Dawa.
	Moxiram	Ram pharma	- Mox -3 Letters from the generic name A**mox**ycillin. - I - combining letter. - Ram - from the company name: **Ram** pharma
	Penamox	Hikma	- Pen - 3 letters from the generic name **pen**icillin. - Amox - 4 Letters from the Generic Name **Amox**ycillin
	Ultramox	APM	- Ultra - additional letters (might be from the beginning of the word **Ultra**violet light which kills bacteria) - Mox -3 Letters from the generic name A**mox**ycillin
Ciprofloxacin	Bactall	JPM	- Bact - 4 letters From the Word: **Bac**teria. - All - additional characters.
	Cipro	JOSWE	- Cipro - 5 letters from the generic name **Cipro**floxacin
	Ciprobay	Bayar	- Cipro - 5 letters from the generic name **Cipro**floxacin. - Bay - from the company name: **Bay**ar
	Ciprodar	Dar Al Dawa	- Cipro - 5 letters from the generic name **Cipro**floxacin. - Dar - from the company name: **Dar** Al Dawa
	Ciproflacin	Ram pharma	- Ciproflacin - Removal of selected letters from the Generic Name
	Ciproflox	APM	- Ciproflox - 9 letters from the generic name **Ciproflox**acin.
	Ciprolon	Hikma	- Cipro - 5 letters from the

			generic name **Cipro**floxacin. - Lon - from the word Quino**lon**e (The quinolones are a family of synthetic broad-spectrum antibiotic drugs). (**Chemical name)**
	Ciropharm	Dawleyh	- Cipro - 5 letters from the generic name **Cipro**floxacin.
	Ciproquin	Hayat	- Cipro - 5 letters from the generic name **Cipro**floxacin. - Quin - from the word **Quin**olone (The quinolones are a family of synthetic broad-spectrum antibiotic drugs).
	Floroxin	United	- Floro - from the word **fl**u**oro**quinolones, which have a fluorine atom attached to the central ring system. **(Chemical name)** - Xin - 3 letters from the generic name Ciproflo**x**ac**in**
	Riveroxin	Joriver	- River - from the company name: Jo**river**. - Oxin - 4 letters from the generic name Ciprofl**ox**ac**in**
Trimethoprim + Sulfamethoxazole	Balkatrin	APM	- Balka - from the word is **Balqa'** which is one of the governorates of Jordan. It is located northwest of Amman, Jordan's capital - Tri - 3 letters from the generic name **Tri**methoprim
	Bactrim	Roche	- Bac - the cause of the infection (**bac**teria) - Trim **-** 4 letters from the generic name **Trim**ethoprim
	Nortrim	JPM	- Nor - Additional letters. - **Trim -** 4 letters from the generic name **Trim**ethoprim
	Trimidar - M	Dar Al Dawa	- Trim **-** 4 letters from the generic name **Trim**ethoprim - **I -** Additional letter. Dar - Company name: **Dar** Al Dawa.
	Trimol	Julphar	- Trim **-** 4 letters from the generic name **Trim**ethoprim - Ol - Additional letters
Cefaclor	Cloracef	DAD	- All letters from the generic name **Cefaclor with rearrangement.**
	Cefabac	APM	- Cefa - 4 letters from the

		generic name **Cefa**clor - Bac - the cause of the infection (**bac**teria)
	Forticef	RAM - Forti - additional letters. -Cef – 3 letters from the generic name **Cef**aclor
	Pharmachlor	Pharma International - Pharma - from the company name **Pharma** International -Chlor -4 letters from the generic name **Cefaclo** and one additional letter **h**

Table 6: Mapping between the techniques with the drug brand names

The root cause of the disease	Generic name of the drug			Company name	Indication	The location of the factory	Use of Latin root	Chemical name	Organ affected by the disease	Mechanism of action of the drug	Invented name
T.1	T.2	T.2	T.2	T.3	T.4	T.5	T.6	T.7	T.8	T.9	T.10
Acifam	Acifam	Balkatrin	Remofen	Ciprobay	Gastrifam	Balkaprofen	Fenbid	Ciprolon	Stomax	Takepron	Almiral
Pepcidine	Amodine	Bactrim	Amoxicent	Ciprodar	Peptifam	Balkatrin		Ciproquin			Voltaren
Bactall	Famodar	Nortrim	Amoxil	Famodar	Ulceran			Floroxin			Votrex
Bactrim	Famodine	Trimidar -M	Amoxydar	Amoxydar	Pepcidine						
Cefabac	Lansazol	Trimol	Moxiram	Moxiram	Diclogesic						
	Lansomid	Cloracef	Penamox	Lansomid	Ibugesic						
	Lansopral	Cefabac	Ultramox	Riveroxin	Remofen						
	Lanzor	Forticef	Cipro	Amoxicent	Inflaban						
	Lansotec	Pharmachlor	Ciprobay	Iburam							
	Lazal	Diclofen	Ciprodar	Trimidar- M							
	Balkaprofen	Diclogesic	Ciproflacin	Pharmachlor							
	Brufen	Olfen	Ciproflox	Takepron							
	Fenbid	Rofenac	Ciprolon								
	Ibugesic	Voldic	Ciropharm								
	Iburam	Riveroxin	Ciproquin								
	Floroxin	Gastrifam	Peptifam								
	Ultramox										

Table 7: The weight for each technique according to the mapping

#	Techniques	Weight
Disease Related Techniques		
T4	Indication (name of the disease)	16%
T1	The root cause of the disease	9%
T6	Use of Latin root	2%
T8	Organ affected by the disease	2%
T9	Mechanism of action of the drug	2%
Company Related Techniques		
T3	Company name	25%
T5	The location of the factory	4%
Other Techniques		
T2	Generic name of the drug	86%
T7	Chemical name	5%
T10	Invented name	5%