# Arabization of Information and Communication Technology Terms in *Mu'jam al-Musthalachāt at-Tiqniyyah* (Techctionary)

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**ARTICLE INFO**

*Keywords:*
Arabization;
Dictionary;
ICT terms;
loanword taxonomy;
technology;
*wazn* adjustment

*Article History:*
Received : 15/03/2026
Revised : 24/05/2026
Accepted : 28/05/2026
Available Online: 30/05/2026

**ABSTRACT**

Rapid technological progress requires language adjustment, including the Arabization of technical terms in Mu'jam Al-Mushthalachāt At-Tiqniyyah (MAAT, Techctionary), a dictionary published by Saudi Arabia's Ministry of Communications and Information Technology. Consistent Arabization rules have not yet been established, even in this dictionary. This study, therefore, examines changes in the sound, form, and meaning of information and communication technology (ICT) terms borrowed from English into Arabic in MAAT. Using a qualitative library-research design, all 700 entries were collected through the monitoring method and analyzed using distributional and translational equivalence methods, drawing on Haugen's loanword taxonomy, supplemented by theories of sound change, suffixation, phrase structure, and morphological patterns (*wazn*). Most entries are semantic substitutions (loanshifts, 84.86%): loan synonyms, loan homonyms, and *wazn* adjustments. Loanblends (9.14%) are mainly blended compounds, while loanwords (4.00%) show partial phonemic substitution, chiefly fortition. Fourteen entries (2.00%) fit no category. The *wazn* adjustment category and the unclassified data indicate that Haugen's taxonomy needs extension to accommodate root-and-pattern morphology and agreement-driven suffixation. The findings inform the development of Arabic terminology and language planning.

**How to cite (in APA style)**: Istiliani, & Luthfi, K. M. (2026). Arabization of Information and Communication Technology Terms in Mu'jam al-Musthalachāt at-Tiqniyyah (Techctionary). *OKARA: Jurnal Bahasa dan Sastra, 20*(1), 122–140. https://doi.org/10.19105/ojbs.v20i1.19279

## 1. INTRODUCTION

As information and communication technology has evolved, the Arabic language has also transformed, incorporating new terms. Part of this adaptation involves the process of "Arabization"—translating or adapting English-language technological terms into Arabic. The government's attempts to address this situation are carried out through the *Majma' al-Lughah* (Asqi et al., 2018). The best-known academy of this kind, the Academy of the Arabic Language in Cairo (*Majma' al-Lughah al-'Arabiyyah*), was established by royal decree in 1932 to safeguard the integrity of Arabic, meet the needs of modern sciences, and produce dictionaries. Arabic language institutions must construct new vocabulary, translate, adopt, and align terms with Arabic language principles to adapt incoming foreign vocabulary (Malik, 2009). Arabization has accordingly been framed as a means of promoting Arabic and its

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scientific role (Zerrouki, 2024), as a method that nourishes the language and supports translation (Setiyadi, Anhar, & Anwar, 2022), and as a process whose effect on Arabic itself has been examined (Al-Shbiel, 2017). Mass media are one channel through which Arabic circulates, notably for religious communication (Burhanuddin et al., 2024).

Attempts to adapt foreign vocabulary that has become part of the Arabic language have not yet established consistent, universally accepted rules within communities, or even within *Majma' al-Lughah* itself, the authority responsible for standardizing the Arabic language. For example, the standards for Arabization established by *Majma' al-Lughah* in Cairo have sparked controversy among the members. These standards are interpreted in various ways by the organization's members, leading to a split into two groups: conservative purists and moderate modernists (Ghufron, 2019; Khalid, 2019). Likewise, it distinguishes total opposition, total acceptance, and a moderate view that accepts Arabization only when foreign words follow Arabic patterns. The controversy extends beyond vocabulary: Arabicization is also contested as a language-planning issue in Sudan (Balla, 2017), and Arabicization movements in higher education have not achieved their intended outcomes while Englishization has expanded (Abdel-Latif & Alhamad, 2023). This controversy highlights the possibility of differences in Arabization standards across institutions. This leads to inconsistencies and variations in sound, form, and meaning. For example, semantic variations found in the Mu'jam Al-Mushthalachāt At-Tiqniyyah (MAAT, Techctionary) are listed in Table 1.

**Table 1**
Examples of variations in semantic changes in MAAT (2020)

| Data Number | English | Arabic |
|---|---|---|
| 1. | *Web Analytics* | تحليلات المواقع |
| 2. | *Web Wallet* | محفظة الويب |

Based on Table 1, data numbers 1 and 2 show variations in the semantic adaptation of the term "web." In data number 1, the term "web" was adapted semantically to المواقع */al-mawāqi'/,* meaning "website," as defined in MAAT (2020, entry 095). Meanwhile, in data number 2, the term "web" is directly adapted as الويب */al-wīb/,* meaning "online," as defined in MAAT (2020, entry 095). These findings indicate variations and inconsistencies in the Arabization process.

To address these inconsistencies, this study adopts a constructed framework. Haugen's (1950) taxonomy of borrowing serves as the main classification. It is supplemented by Crowley and Bowern (2010) on sound change, Hadi (1995) on suffixes, Irwansyah and Madkur (2019) on phrases, and Astari (2015) on morphological patterns (*wazn*). Haugen (1950) classified the results of borrowing into loanwords, loanblends, and loanshifts according to the relation between morphemic and phonemic substitution. Here, loanwords are used to analyze sound changes, loanblends to analyze form changes, and loanshifts to analyze semantic changes. Supporting theories are needed because each category has limitations when applied to Arabic data.

The limitations of each category, and how the supporting theories address them, are as follows. First, Haugen (1950, p. 214) distinguishes degrees of phonemic substitution among loanwords but does not describe the sound changes involved, so Crowley and Bowern's (2010) typology of sound change (e.g., lenition, fortition, and epenthesis) was added. Although that typology is illustrated with examples from English dialects and other

languages rather than from English–Arabic contact, a sound-change theory was also combined with Haugen's framework by Astari (2015) and Meliana (2022). Second, Haugen (1950, p. 215) defines loan blends as combinations of imported and substituted morphemes but says nothing about Arabic suffixes and phrase types; Hadi's (1995) rules for suffix adaptation and Irwansyah and Madkur's (2019) English phrase types, compared with Arabic phrase structure, fill this gap. Third, Haugen's (1950, p. 216) loanshifts concern semantic relations (homonym and synonym) and cannot capture Arabic derivational patterns (*wazn*), so Astari's (2015) *wazn* classification was added as a subcategory. These limitations stem from the general, English-based nature of the theory; they were treated as analytical gaps to be filled, not as grounds for rejecting Haugen's framework.

Prior studies of Arabization have used different data and frameworks. Meliana (2022) examined phonological adaptation in Arabic Mobile Legends hero stories using Haugen's (1950) classification and Hadi's (2002) account of sound change, and identified loanwords, loanblends, loanshifts, and vowel and consonant changes. Asmara (2019) analyzed terms in a senior high school biology textbook through the fiqh al-lughah approach and found letter and vowel-mark substitution, addition, and deletion. Syaifullah (2020) studied cultural terms in the magazine Alo Indonesia and reported both rules and inconsistencies in *ta'rīb*. Astari (2015) analyzed science and technology terms from general dictionaries and two Arabic news sites using Haugen's (1950) classification and other sound-change and sociolinguistic theories; she found that vowels remain close to their source sounds and that translation occurs mainly in prefixes and suffixes. Andriani (2010) applied an assimilation theory to the entries of the al-Mawrīd dictionary and described phonological and morphological adaptation.

Synthesizing these studies reveals three gaps. First, the data come from general dictionaries, news, textbooks, or popular media; none uses a specialized dictionary issued by an official institution (Andriani, 2010; Astari, 2015). Second, Haugen's (1950) framework is used only partially: Astari (2015) omitted its sub-classifications, and both Meliana (2022) and Astari (2015) added sound-change theories to analyze loanwords. Third, Haugen's theory is classical, whereas MAAT (2020) includes modern ICT terms, and few studies analyze semantic relations or morphological patterns in addition to sound and form. Semantic change in borrowing has also been studied in the reverse direction: Rohbiah, Nur, and Gunardi (2017) found that 6 of 10 Arabic loans in English economic terms had changed meaning, while 4 had kept it. This study addresses these gaps by combining Haugen's taxonomy with more recent supporting theories and applying it to all entries of one institutional ICT dictionary.

Regarding data sources, the dictionary-based studies by Astari (2014) and Andriani (2010) relied on general-purpose dictionaries that were neither specialized to a field nor published by an official institution. This study instead uses a specialized ICT dictionary, MAAT, published in 2020 by the Saudi Ministry of Communications and Information Technology in Riyadh.

Studies of Arabic IT terminology outside Indonesia point to similar inconsistency. (Hassan, 2017) showed that the Microsoft Terminology Collection applies translation, Arabicization, and Arabic-expanding techniques inconsistently, even for similar terms. Wan, Bakar, Zainal, and Jamsari (2021) analyzed IT terms from a translator's website and reported that 44% of the data were compounds and that translators often translated literally. Al-Athwary and Ali (2024), using four corpora, identified four loan-translation strategies (morphosyntactic pattern alteration, literal translation, loan blending, and metaphorical extension), found that metaphors based on functional similarity helped IT terms gain

acceptance, and called for coordination among language academies. Awang and Salman (2017) examined translation and Arabicization methods for English scientific and technical terms, and Al-Janadbah and Khalifa (2026) discuss the impact of the digitalization of Arabic on the knowledge economy, a context in which technical terminology becomes consequential. These studies draw on translators' and press data rather than on a dictionary compiled by an official institution, so MAAT (2020) offers a different vantage point on the same problem.

According to the previously stated arguments, this study aims to identify changes in the sound, form, and meaning of information and communication technology terms during their Arabization at MAAT (2020). The study contributes (1) a classification of all 700 entries of an institutionally published ICT dictionary, (2) a proposed *wazn*-adjustment subcategory within Haugen's loanshifts, and (3) a documented set of data that fit no existing category. Its research questions are: 1) What are the changes in sound, 2) changes in form, and 3) changes in the meaning of information and communication technology terms that have been borrowed from English into Arabic in MAAT (2020)?

## 2. METHOD

This study used a verifiable qualitative approach because some data did not align with the theory. In this approach, a hypothesis or theory is constructed from the data found (Bungin, 2005, pp. 119 and 121). It is library research because the data come from a dictionary (Zaim, 2014). The data in this study were obtained from a dictionary of information and communication technology terms, namely *Mu'jam al-Mushthalachāt at-Tiqniyyah* (Techctionary). The official institution, MAAT (2020), *Wizārah Al-Ittishālāt wa Tiqniyyah Al-Ma'lūmāt* (Ministry of Communications and Information Technology), was established through the Think Tech initiative in Riyadh, with its first edition released in 2020. MAAT (2020) contains information and communication technology terms organized into seven sections: open source, big data, artificial intelligence, virtual reality and augmented reality, cloud computing, the Internet of Things, and blockchain. Each section consists of 100 entries, bringing the total number of entries in the dictionary to 700. All 700 entries were analyzed in this study; nevertheless, the research results presented here represent only a selection from each theoretical classification, as described in the following paragraphs. Definitions and synonyms were checked against Al-Munawwir, Al-'Ashriy, and The Oxford English Dictionary. The dictionary can be downloaded at https://bit.ly/4kqqWX3.

Data in this study were collected using the monitoring method. The monitoring method is a data collection method conducted by reading and observing entries of information and communication technology terms in MAAT (Zaim, 2014). The basic technique used is the extraction technique (Mahsun, 2012). This technique works by capturing English and Arabic term entries in MAAT (2020) and then classifying them based on theoretical categories, which are changes in sound, form, and meaning. The follow-up technique used was note-taking. The note-taking technique was performed on paper containing a data collection table (Zaim, 2014). The data, which had been classified into the categories of loanwords, loanblends, and loanshifts, was then recorded and compiled into a table in Microsoft Word.

After being obtained, the data were analyzed using the distributional and translational equalization methods. The distributional method was used to analyze sound changes, with the basic technique focusing on direct elements. The entries in MAAT (2020) were divided into several elements, including vowels and consonants (Sudaryanto, 2015, p. 37). The advanced techniques used were substitution and expansion. The substitution technique

involves replacing specific elements of English with specific elements of Arabic. The expansion technique involves expanding English units using specific Arabic elements (Sudaryanto, 2015). The distributional method is also used to analyze morphological changes. The basic technique used is direct element division, which involves dividing entries into word units and suffixes. The advanced technique used is substitution.

The translational equivalence method is used in the analysis of semantic change. The translational equivalence method uses another language—namely, English—as its reference point (Zaim, 2014). The basic technique used is the application of discriminative criteria to categorize information and communication technology terms into three categories: homonymic loanwords, synonymous loanwords, and noun adjustments to the *wazn.* The advanced technique used is the comparative equivalence technique, which identifies similarities between the meanings of English and Arabic terms through their semantic fields (Zaim, 2014).

After analysis, the data is then presented using both formal and informal methods. The formal presentation method uses symbols or marks to present the results of data analysis, such as the slash (/…/) to present transliteration from Arabic to Latin script or vice versa, square brackets ([…]) to present phonetic transcriptions, parentheses ((…)) to present translations from Indonesian to English or from English to Indonesian, or to explain a previous word, and single quotation marks (‘…’) to present definitions of terms from a dictionary (Sudaryanto, 2015). The informal presentation method uses common words and technical terminology to present the results of data analysis (Zaim, 2014). Data are presented descriptively based on theoretical classifications. One data sample is presented for each theoretical classification, and categories with fewer than three items are shown in full.

Data validity was tested through prolonged observation, persistence, triangulation, and peer discussion with the supervisor (Sugiyono, 2013). Prolonged observation meant repeatedly examining MAAT entries (2020), persistence meant careful and continuous classification, and triangulation meant checking the findings against the data-collection table. The English or Arabic origin of entries was verified in Merriam-Webster Online and the Mu'jam al-Lughah al-'Arabiyyah al-Mu'āṣirah. English pronunciation was checked using native-speaker pronunciation videos on YouTube and, when those were unavailable, Merriam-Webster; when neither was available, phonetic theory was applied. Arabic pronunciations relied on phonetic theory, the same Arabic dictionary, and discussion with the supervisor. No direct validation with native speakers was conducted.

## 3. RESULTS

Table 2 shows the distribution of the 700 MAAT (2020) entries across the categories of the framework. The analysis of each category follows. Table 2, shows that all 700 entries were classified. Loanwords account for 28 entries (4.00%): 6 without phonemic substitution (0.86%) and 22 with partial phonemic substitution (3.14%). Loanblends account for 64 entries (9.14%): 5 blended derivatives (0.71%) and 59 blended compounds (8.43%). Loanshifts account for 594 entries (84.86%): 180 loan homonyms (25.71%), 362 loan synonyms (51.71%), and 52 *wazn* adjustments (7.43%). The framework could not accommodate the remaining 14 entries (2.00%).

**Table 2**
Tabulation of Information and Communication Technology Terms in MAAT

| Categories | Types | Amount of Data Distribution | Percentage (%) |
|---|---|---|---|
| Sound changes | *Loanwords* without phonemic substitution | 6 | 0.86 |
| | *Loanwords* with partial phonemic substitution | 22 | 3.14 |
| Form changes | *Blended derivative* | 5 | 0.71 |
| | *Blended compounds* | 59 | 8.43 |
| Semantic changes | *Loan homonym* | 180 | 25.71 |
| | *Loan synonym* | 362 | 51.71 |
| | *Wazn* (morphological patterns) Adjustment | 52 | 7.43 |
| Data not addressed by the theory | | 14 | 2.00 |
| **Total Number** | | **700** | **100** |

## 4. DISCUSSION

The discussion follows the three categories of Haugen's (1950) taxonomy: loanwords (sound changes), loanblends (form changes), and loanshifts (semantic changes). Each subsection interprets the sample data in light of the supporting theories; the final subsections discuss data that the framework could not accommodate and the theoretical implications.

### 4.1 Sound Changes

The sound changes in this study fall under one of the categories in Haugen's theory of the results of word borrowing, known as loanwords. According to Haugen (1950), loanwords are the result of borrowing through the importation of entire morphemes without substitution, though they may or may not involve phonemic substitution. In this study, sound changes were found both without substitution and with partial substitution. Of the 22 items with partial substitution, 11 show fortition, 5 lenition, 5 epenthesis, and 1 cluster reduction (Crowley & Bowern, 2010a, pp. 24–47). Examples include the term "nonce" [nɑ:ns], which was borrowed as النونس [an-nu:ns]; "git" [gɪt], which was borrowed as جيت [ʤi:t]; and the term "hadoop" [hɑdu:p], which was borrowed as هادوب [ha:du:b].

**Table 3**
Sample data of loanwords without phonemic substitution

| English | Arabic |
|---|---|
| *Nonce* [nɑ:ns] | النونس [an-nu:ns] |

Loanwords without phonemic substitution are the result of borrowing in which no phonemic substitution occurs (Haugen, 1950, p. 214). Based on Table 3, the term "nonce" [nɑ:ns], in terms of sound or phonetic transcription, was fully borrowed into Arabic as النونس [an-nu:ns]. The nasal consonant [n] was retained. The long vowel [ɑ:] corresponds to [u:] in the Arabic term; both are back vowels, differing only in tongue height ([ɑ:] is low, [u:] is high). The consonant cluster [ns] was retained. Because the vowel change stays within the back-vowel class, the item is classified as a loanword without phonemic substitution; this borderline case illustrates the classification ambiguity discussed later.

**Table 4**
Sample data of loanwords with partial phonemic substitution

| English | Arabic |
|---|---|
| *Git* [gɪt] | جيت [ʤi:t] |
| *Hadoop* [hɑdu:p] | هادوب [ha:du:b] |

Loanwords with partial phonemic substitution are the result of borrowing that involves phonemic substitution, but only partially (Haugen, 1950). In other words, loanwords with partial phonemic substitution are the result of partial borrowing from a phonemic perspective. Based on Table 4, there is an example of partial phonemic substitution marked by the weakening of the consonant [g] at the beginning of the English term git [gɪt], which was borrowed into Arabic as [ʤ] in the term جيت [ʤi:t]. The sound [g] is an occlusive or plosive consonant. This plosive sound is produced by blocking the airflow so that it stops abruptly, then releasing it suddenly (Marlina, 2019, p. 57).

The [g] sound is produced at the dorso-velar articulation area. The [ʤ] sound is a blended consonant or fricative. It is pronounced by tightly blocking the airflow and gradually releasing it (Marlina, 2019, p. 58). The [ʤ] sound is produced at the fronto-palatal articulation area. According to Marlina (2019, p. 61), all sounds other than plosives are generally referred to as continuous sounds. Plosive sounds are considered stronger than continuous sounds (Crowley & Bowern, 2010a, p. 24). Therefore, the change from the sound [g] to the sound [ʤ] is referred to as sound weakening.

Another term in the category of loanwords with phonemic substitution is “Hadoop.” In the term “Hadoop” [hɑdu:p], the [p] sound at the end of the term is strengthened and, upon being borrowed into Arabic, becomes [b], resulting in هادوب [ha:du:b]. The [p] and [b] sounds are plosive consonants pronounced by blocking the flow of air between the two lips and then suddenly releasing it. Both are bilabial consonants. The difference between these two consonants is that the [p] sound is a hard, voiceless consonant, while the [b] sound is a soft, voiced consonant (Astari, 2015, p. 42). Voiced sounds are considered stronger than voiceless sounds. Therefore, the change from [p] to [b] represents a strengthening of the sound. According to the statements above, these two data points support the previously mentioned theory.

## 4.2 Form Changes

Form changes in this study refer to one of Haugen’s theoretical classifications of word absorption, known as “loanblends.” According to Haugen (1950, p. 215), loan blends are a combination resulting from the processes of importation and partial morpheme substitution, yet their structure aligns with that of the borrowed foreign word. In this study, changes in form, specifically in blended derivatives and blended compounds, were identified.

**Table 5**
Blended derivative data

| English | Arabic |
|---|---|
| *Technical* | التقني/*at-tiqniyy*/ |
| *Cinematic* | السينمائي/*as-sīnimā’iyy*/ |

A blended derivative is a derived word that contains an indigenous suffix, which replaces the foreign suffix (Haugen, 1950, p. 219). The term “technical” in The Oxford

English Dictionary derives from the word “technic” and the suffix “-a (Murray, 1989). According to Table 5, the term “technic” was borrowed as التقن /at-tiqn/ and the suffix -al was borrowed as ـيّ */yā’ nisbah/*, so the term “technical” was borrowed as التقنيّ */at-tiqniyy/.* Additionally, the term “cinematic” is an example of a blended derivative. The term “cinematic” in The Oxford English Dictionary derives from the word “cinema” and the suffix “-ic” (Murray, 1989). Therefore, the term “cinema” was borrowed as السينما */as-sīnimā/* and the suffix -ic was borrowed as ـيّ */yā’ nisbah/,* resulting in the term “cinematic” being borrowed as السينمائيّ*/as-sīnimā’iyy/.* According to the statements above, these two examples support the theories mentioned earlier.

**Table 6**
Blended compounds data

| English | Arabic |
|---|---|
| *Genesis Block* | كتلة جينيسيس */kutlah jīnīsīs/* |
| Camera Array | صف الكاميرا */shaff al-kāmīrā/* |

Blended compounds are the result of combined assimilation (Haugen, 1950, p. 219). According to Table 6, the English term “genesis block” consists of the noun (N1) “genesis” and the noun (N2) “block.” The Arabic term كتلة جينيسيس */kutlah jīnīsīs/* also consists of N1 كتلة */kutlah/,* referred to as the antecedent (*mubdal minhu*), and N2 جينيسيس /jīnīsīs/, referred to as the appositive (*badal*). Both are noun phrases, but Arabic adds the appositive construction, which English lacks.

Form changes also occur in the positioning of terms. The term “genesis,” which is N1, changes its position after being borrowed into Arabic and becomes N2. The term “genesis” is transliterated as جينيسيس */jīnīsīs/*, “block” was translated by meaning into Arabic as كتلة */kutlah/.* The term “block” means “a quantity of something or an amount of time that is considered as a single unit” (Hornby, 2005, p. 152). Furthermore, the term كتلة */kutlah/* in the Al-‘Ashriy dictionary is defined as “a pile, a collection, a group, or a block” (Ali & Muhdlor, 1998, p. 1494). The definition of “genesis block” in the MAAT dictionary (2020, entry 051) is "the first block created on the blockchain, containing 50 bitcoins and an encrypted message from its creator." The meaning "containing 50 bitcoins" demonstrates the alignment of the meanings of "block" and "group" with that of the phrase "genesis block."

Another term that includes blended compounds is “camera array.” The English term “camera array” consists of N1 “camera” and N2 “array.” The Arabic term صف الكاميرا */shaff al-kāmīrā/* also consists of N1 صف */shaff/,* referred to as the mudhāf, and N2 الكاميرا */al-kāmīrā/,* referred to as the *mudhāf ilaih*. The difference in the *iḍāfah* construction, which has no English counterpart.

The term “camera,” which is N1 in English, becomes N2 in Arabic; it is transliterated as الكاميرا */al-kāmīrā/*, while “array” is translated by meaning into Arabic as صف */shaff/.* The term “array” means “a set of numbers, signs, or values arranged in rows and columns” (Hornby, 2005, p. 70). The term صف */shaff/* means “row” or “series” (Munawwir, 2020, p. 782). The definition of “camera array” in the MAAT dictionary (2020, entry 040) is "a system of multiple cameras arranged around a subject, either 180 or 360 degrees." The phrase "multiple cameras arranged" demonstrates the alignment among the meanings of "array," "row," and "camera array." In both examples, the English modifier–head order is reversed to the Arabic head-first order, the head noun is translated by meaning, and the modifier is transliterated.

### 4.3 Semantic Changes

In this study, semantic changes refer to one of Haugen's theoretical classifications of word absorption, called "loanshifts." According to Haugen (1950, p. 215), loanshifts result from the process of complete morphological substitution without the importation of the source word. In this study, semantic changes were identified as homonymic borrowings, synonymous borrowings, and morphological adaptations. For example, the term "data lake" was borrowed as بحيرة البيانات */buchairah al-bayānāt/,* the term "data mining" was borrowed as تنقيب البيانات */tanqīb al-bayānāt/,* the term "schema" was borrowed as مخطّط */mukhaththath/,* the term "avatar," which was adapted as الصورة الرمزيّة */ash-shūrah ar-ramziyyah/,* the term "debug," which was adapted as التصحيح */at-tashhīh/,* and the term "sharding," which was adapted as المشاركة */al-musyārakah/.*

**Table 7**
Homonym absorption data

| English | Arabic |
|---|---|
| *Data Lake* | بحيرة البيانات */buchairah al-bayānāt/* |
| *Data Mining* | تنقيب البيانات */tanqīb al-bayānāt/* |

Loan homonym, or homonymic borrowing, occurs when the new meaning of a borrowed word differs from its original meaning, resulting in the word having two homonymous meanings (Haugen, 1950, p. 219). According to Table 7, the term "data lake" was semantically borrowed into Arabic as بحيرة البيانات */buchairah al-bayānāt/* based on functional equivalence. In this context, "function" refers to the purpose or use of something (Language Center of the Ministry of National Education, 2008, p. 400). The term "data" was semantically borrowed as "البيانات" */al-bayānāt/,* and the term "lake" was semantically borrowed as "بحيرة" */buchairah/.*

Considering its old meaning, the term بحيرة */buchairah/* in the Al-Munawwir dictionary means "lake" (Munawwir, 2020, p. 60). Meanwhile, the term بحيرة البيانات */buchairah al-bayānāt/* in the MAAT dictionary (2020, entry 027) has been adopted with a new meaning: 'a repository that holds a large amount of data in its original format until it is required or ready to be processed.' The new meaning of the term بحيرة */buchairah/,* namely 'a storage facility that holds a large amount of …', has no semantic connection to or differs from its original meaning, namely 'lake'.

The word "lake" has a semantic field that includes rivers, swamps, canoes, freshwater, and so on. Meanwhile, the new meaning of the term بحيرة */buchairah/* does not fall within the semantic field of "lake." This loanword is based solely on the similarity in function between a lake—as a place that holds water—and the technological term "data lake"—as a place that holds data. A narrowing of meaning has occurred in this term. Based on the above analysis, the term "data lake," which has been semantically borrowed into Arabic as بحيرة البيانات */buchairah al-bayānāt/,* constitutes a homonymic borrowing.

Another term in the category of loan homonyms is "data mining." The term "data mining" has been semantically borrowed into Arabic as تنقيب البيانات */tanqīb al-bayānāt/* due to their similar purpose. "Purpose" refers to "intent" (Language Center of the Ministry of National Education, 2008, p. 1493). In this context, "purpose" refers to the intent behind an action or task. The term "data" has been semantically borrowed as "البيانات" */al-bayānāt/*, and the term "mining" has been semantically borrowed as "تنقيب" */tanqīb/*. Considering its old meaning, the term تنقيب */tanqīb/* in the Al-'Ashriy dictionary means "investigation" (Ali &

Muhdlor, 1998, p. 596). Meanwhile, the term تنقيب البيانات */tanqīb al-bayānāt/* in the MAAT dictionary (2020, entry 029) has been adapted to mean “the process of studying big data to locate useful patterns and information”.

The new meaning of the term تنقيب */tanqīb/*, namely “to study,” has no semantic connection to—or differs from—its original meaning, which is “investigation.” The word “investigation” encompasses a semantic field that includes espionage, evidence, the police, criminal acts, and so on. Meanwhile, the new meaning of the term تنقيب */tanqīb/* does not fall within the semantic field of “investigation.” This loanword is based solely on the shared purpose of “investigation”—to seek out and uncover information—and, in the context of technology, تنقيب */tanqīb/* refers to uncovering big data, a narrowing of meaning has occurred in this term. Based on the above analysis, the term "data mining," which has been semantically adopted into Arabic as تنقيب البيانات */tanqīb al-bayānāt/*, is a loan homonym. Accordingly, these two data points confirm the previously mentioned theory.

**Table 8**
Synonym absorption data

| English | Arabic |
|---|---|
| *Schema* | مخطّط */mukhaththath/* |
| *Avatar* | الصورة الرمزيّة */ash-shūrah ar-ramziyyah/* |

Loan synonym, or a borrowed synonym, refers to a situation where the new meaning of a borrowed word overlaps with the old meaning, merely adding a new nuance to the original morpheme (Haugen, 1950, p. 219). According to Table 8, the term “schema” was semantically borrowed into Arabic as مخطّط */mukhaththath/*. When examined in terms of its old meaning, the term مخطّط */mukhaththath/* in the Al-Munawwir dictionary means “striped” (Munawwir, 2020, p. 351). The term مخطّط */mukhaththath/* in the MAAT dictionary (2020, entry 030) has been adopted with a new meaning: “an outline or diagram depicting a database.” This new meaning of مخطّط */mukhaththath/* is broadly related to or similar to its old meaning, which is “lined.”

Nevertheless, the new meaning of مخطّط */mukhaththath/* is used in the context of information and communication technology, resulting in a nuance in its meaning—specifically, the qualifier “that depicts a database.” The meaning “schema or diagram” falls within the same semantic field as “lined,” because “schema or diagram” is closely related to “lines.” Examples within the semantic field of “schema or diagram” include tables, bar charts, pie charts, shaded diagrams, and so on. Based on the analysis above, the term “schema,” which has been semantically borrowed into Arabic as مخطّط */mukhaththath/*, constitutes a synonymous borrowing.

Furthermore, the term “avatar” also belongs to the category of loan synonyms. The term “avatar” was semantically borrowed into Arabic as الصورة الرمزيّة */ash-shūrah ar-ramziyyah/*. Considering its old meaning, the term الصورة */ash-shūrah/* in Al-Munawwir’s dictionary means ‘image’ (Munawwir, 2020, p. 803), and the term الرمزيّ /ar-ramziyyah/ means “symbolic, (as a symbol)” (Munawwir, 2020, p. 532). Therefore, the term الصورة الرمزيّة */ash-shūrah ar-ramziyyah/* can be interpreted as “a symbolic image.” The term الصورة الرمزيّة */ash-shūrah ar-ramziyyah/* in MAAT (2020, entry 047) has been adopted with a new meaning: ‘the virtual representation of a user’s character in a virtual reality world’.

The new meaning of the term الصورة الرمزيّة */ash-shūrah ar-ramziyyah/* belongs to the same semantic field as its original meanings—“image” and “symbolic”—because “symbol” is closely related to “representation.” Among the semantic fields associated with “symbolic”

are image, reference, category, sign, and so on. The term الصورة الرمزيّة */ash-shūrah ar-ramziyyah/* is applied in the context of information and communication technology, introducing a new nuance to its meaning, namely the concepts of “virtual” and “virtual reality.” The Arabic rendering may, however, capture the meaning of “avatar” only partially.

The old meaning of the term cannot be directly interpreted as its new meaning. This is because "symbolic image" may have other possible meanings, such as "logo" or "badge." Moreover, when referring to the new meaning, "virtual representation…" does not specifically refer to an "image" but can also refer to "video" or "text." Based on the above analysis, the term "avatar," which has been adopted into Arabic as الصورة الرمزيّة */ash-shūrah ar-ramziyyah/*, is a loan synonym. According to the statements above, these two data points confirm the previously mentioned theory.

**Table 9**
*Wazn* adjustments data

| English | Arabic |
|---|---|
| *Debug* | التصحيح */at-tashhīh/* |
| | تفعيل */taf'īlun/* |
| *Sharding* | المشاركة */al-musyārakah/* |
| | مفاعلة */mufā'alatun/* |

The *wazn* adjustments in this study are derived from Astari’s (2015, pp. 154–173) theory, which classifies loanwords into 35 *wazn* categories. Of these 35 *wazn* categories, only 18 are present in this study, including loanwords following the patterns فعال */fi'ālun/,* فعالة */fi'ālatun/,* فعل */fa'lun/,* فعل /fuʿlun/, فعلة */fu'latun/,* تفعيل */taf'īlun/,* مفاعلة */mufā'alatun/,* إفعال */if'ālun/,* تفاعل */tafā'ulun/,* تفعل */tafā'ulun/,* مفاعل */mufā'ilun/,* مفعل */muf'ilun/,* متفعّل */mutafa''ilun/,* فعول */fu'ūlun/,* فعِّل */fa''īlun/,* مفعل */mufa'ilun/,* and مفتعل */mufta'ilun/*. As for categories of *wazn* other than those mentioned above, they were not found in this study. *Wazn* adjustment is placed under loanshifts because the English source is not imported: it is replaced by a native derivational pattern whose morphological meaning helps carry the concept, which fits Haugen’s (1950, p. 215) definition of loanshifts as substitution without importation

Information and communication technology terms that have been translated and adapted into Arabic *wazn*, whether from quadriconsonantal or triliteral verbs (Astari & others, 2014, pp. 153–154). The *wazn* analyzed in this study is the ism musytaq *wazn* (derived noun patterns). A derived noun is a word derived from another word that conveys a meaning described by an attribute (Ni’mah, n.d., p. 38). According to Table 9, the term “debug” was translated as التصحيح */at-tashhīh/* by adapting it to the تفعيل */taf'īlun/* pattern.

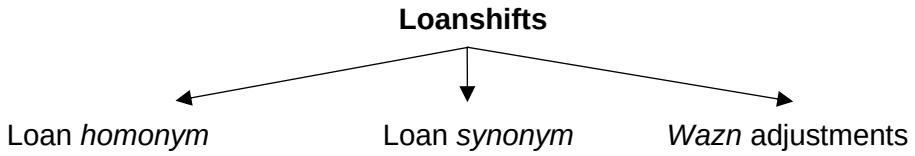
The *wazn* pattern تفعيل */taf'īlun/* conveys several morphological meanings, including the transitivization of intransitive verbs, the same meaning as the original pattern, repetitio (Haywood in Astari & others, 2015), activities that require precision and are carried out intensively, linking an object to a verb, deriving a verb from a noun, and activities that separate something from an object (Astari, 2015, p. 159). In MAAT (2020, entry 021), التصحيح */at-tashhīh/* means “the process of removing bugs from an open-source project’s source code,” that is, “the process of removing bugs from the source code of an open-source project.” The meaning of the term التصحيح */at-tashhīh/* refers to an activity that separates something from an object.

Furthermore, a term that is classified under the category of *wazn* adjustment is “sharding.” The term “sharding” adjusts the *wazn* pattern مفاعلة /mufā’alatun/ to المشاركة */al-musyārakah/*. The *wazn* pattern مفاعلة */mufā'alatun/* conveys several meanings, including an

activity performed collectively, the transitivization of intransitive verbs, the indication of the quality and intensity of work, and intransitive verbs (Astari, 2015, p. 160). In MAAT (2020, entry 084), المشاركة */al-musyārakah/* means "the process of dividing a blockchain network into several smaller networks known as shards, which can process transactions simultaneously." The meaning of the term المشاركة */al-musyārakah/* refers to an activity carried out collectively. According to the statement above, these two pieces of data support the existing theory regarding the expansion of the "*wazn* adjustment" subcategory, and the focus of this discussion is the meaning within the *wazn*.

### 4.4 Unique Data

The inclusion of supporting theories in each of Haugen's classifications is intended to address the limitations of Haugen's theory. Haugen's theory is a general theory of loanwords derived from English, whereas the data analyzed in this study are from Arabic. For example, Arabic terms, considered from the perspective of *wazn*, are not accommodated in Haugen's theory. Therefore, this study introduced a subclassification of *wazn* adjustments within "loanshifts" by adapting Astari's (2015) theory.




Furthermore, the theory of the semantic field was used to reinforce the analysis of loan homonym data. After comparing the two meanings, the original meaning of the Arabic term was analyzed using the semantic field to determine the relationship between the new and old meanings, which can be seen as the rationale for selecting terms with new meanings in the context of information and communication technology.

Other supporting theories also have their shortcomings. For example, Crowley's theory discusses types of sound changes. Crowley and Bowern's (2010) textbook illustrates sound change using examples from English dialects and other languages, rather than from English–Arabic borrowing. English and Arabic differ in several ways; for example, English is characterized by a discrepancy between spelling and pronunciation, whereas Arabic is not—spelling and pronunciation are identical (Andriani, 2010, p. 102). Consequently, there are several classifications for which no data are available.

Several theoretical classifications received no data, such as loanwords with complete phonemic substitution and blended stems, while some data fit none of them. A plausible explanation is that the theories used are general rather than Arabic-specific or modern, whereas MAAT (2020) is a recent dictionary. Differences between English and Arabic in grammar, articulation, spelling, and script may also contribute (Andriani, 2010, p. 102). Unique data that could not be accommodated by the theories used in this study are classified into four categories: excluded data, data inconsistent with the theory, data considered erroneous, and abnormal data. These data are as follows.

### 4.5 Excluded Data

According to the problem statement, the data analyzed in this study consists of English terms listed in the MAAT dictionary (2020). However, two terms did not originally originate in English: "Satoshi" and "Satoshi Nakamoto."

**Table 10**
Excluded data

| No. | English | Arabic | Definition in the Techtionary Dictionary |
|---|---|---|---|
| 1. | Satoshi | ساتوشي | The smallest unit of the bitcoin cryptocurrency. |
| 2. | Satoshi Nakamoto | ساتوشي ناكاموتو | The creator of the Bitcoin protocol. |

According to Table 10, the two terms above were excluded from the research data on the assumption that they are not native to English but derive from a Japanese form of a personal name. The term "satoshi" in MAAT (2020, entry 031) is listed in the Oxford English Dictionary online, defined as “the smallest monetary unit in the Bitcoin digital payment system, equal to one hundred millionth of a bitcoin.” “Satoshi Nakamoto” in MAAT (2020, entry 032) is a personal name, not a product, system, or mechanism, and designates the creator of the Bitcoin protocol. Because the name is Japanese in form while its bearer’s identity and nationality remain unverified (Nakamoto & Champagne, 2014, p. 344), both items were treated as outside the English-origin data. The solution proposed for cases like this is to conduct a more in-depth investigation into terms from other languages that were first borrowed into English and then, diachronically, into Arabic.

### 4.6 Data That Does Not Match the Theory

During data collection, 10 data points were found that did not align with the underlying theory. These data points indicated findings that differed from what was described in the theory. They were identified in the “blended derivative” data category. They included the terms “RFID reader,” “demographic data” “cave automatic virtual environment,” “Internet of Medical,” “wearable technology,” “disruptive technology,” and “interactive video (IV).” These data points were classified based on the theory proposed by Hadi (1995, p. 117) as follows.

First, the suffixes -ist and -er are assimilated by adding the ya’ nisbah at the end of the term. During the data collection process, one English term with the suffix -er was identified, namely “RFID Reader.” However, the suffix -er in this term was not assimilated by adding the ya’ nisbah at the end of the term, as stated by the theory, but rather by adapting it to the Arabic pattern of the fa’il noun (فاعل */fā’il/*), namely قارئ */qā’ri’/*.

Second, adjectives with the suffixes -an, -ic, -al, and -ive are assimilated by adding yā’ nisbah at the end of the term. During the data collection process, five instances were found where the loanwords did not conform to the theory; instead, they were adapted using the ya’ nisbah with the addition of ة */ta’ marbuthah/* and were adapted to ا /alif/ and ت */ta’/*, similar to the sign for the sound “*jam’ muannats sa’lim*,” as shown in the table below.

**Table 11**
Data that does not match the theory

| No. | English | Arabic | Suffix Changes |
|---|---|---|---|
| 1. | Demographic Data | البيانات الديموغرافيّة */al-bayānāt ad-dīmūghrāfiyyah/* | ـيّ */yā’ nisbah/* dengan tambahan ة */tā’ marbuthah/* |
| 2. | Cave Automatic Virtual Environment | البيئة الافتراضيّة واقع معزّز */al-bī’ah al-iftirādhiyyah wāqi’ mu’azzaz/* | ـيّ */yā’ nisbah/* dengan tambahan ة */tā’ marbuthah/* |
| 3. | Internet of Medical Things | إنترنت الأشياء الطبيّة */intirnit al-asyyā’ ath-thibbiyyah/* | ـيّ */yā’ nisbah/* dengan tambahan ة */tā’ marbuthah/* |

According to Table 11, the suffix -ic in the term “demographic” is assimilated into ـيّ */yā’ nisbah/* with the addition of ة */tā’ marbuthah/* in the term الديموغرافيّة */ad-dīmūghrāfiyyah/*. The addition of ة */tā’ marbuthah/* to the term الديموغرافي ّ*/ad-dīmūghrāfiyy/* is due to the preceding word being the sound plural (*jam‘ muannats sālim*) of البيانات */al-bayānāt/*, with the vowel marks ا */alif/* and ت */tā’/*. The term البيانات الديموغرافيّة */al-bayānāt ad-dīmūghrāfiyyah/* is a *na’tiy* (adjective) phrase, so the *na’t* (adjective) and *man’ūt* (modified noun) must agree in gender. Therefore, the term الديموغرافي ّ*/ad-dīmūghrāfiyy/,* which functions as a *na’t* (adjective) must adjust its gender to match that of the man’ūt البيانات */al-bayānāt/* by adding a ة */tā’ marbuthah/* at the end of the term.

The same agreement pattern occurs in “automatic,” whose suffix -ic is adapted as يّ /yā’ *nisbah*/ with ة/tā*’’ marbuthah/* in الافتراضيّة */al-iftirādhiyyah*/ to agree with the feminine *man’ūt* البيئة */al-bi’āh/.* and in “medical,” adapted as الطبيّة/ath-thibbiyyah/ to agree with the broken plural الأشياء/al-‘asyyā’/, is treated as feminine.

Third, no English term in the data was assimilated with the expected rendering of the suffix “-logy” as “lūjiya.” The two terms ending in“technology” were instead adapted with yā’ nisbah” and tā’ marbuthah” as in “disruptive technology”, التقنية التخريبية */at-tiqniyyah at-takhrībiyyah/, or with the* sound feminine plural, as in “wearable technology”, التقنيات القابلة للارتداء */at-tiqniyyāt al-qābilah lil-irtidā’/.*, in agreement with the plural modifier.

In addition to the data mentioned above, there is one other piece of data that does not align with the theory: the term “interactive video” (IV), which was adapted as (IV) الفيديو التفاعلي */al-vīdiyū at-tafā’iliyy*/. Structurally, the suffix -ive in the term “interactive” was adapted with ـيّ*/yā’ nisbah/*, consistent with the theory. However, the word’s etymology indicates that the -ive in this case is not a suffix denoting an adjective, but rather the word “active.” According to the dictionary on etymonline.com, “interactive” is a compound of the words “interact” and “active.” The solution to the cases above is to remove that data from the theoretical classification and address it separately with a more detailed discussion.

### 4.7 Considered Incorrect Data

Four entries may reflect oversight or the absence of an adopted equivalent: "sensor node," "first-party ad delivery," "proprietary software," and "know your customer." The terms "sensor node" and "first-party advertisement delivery" were neither adapted nor translated into Arabic, but were left as is. Alternatively, no equivalent capable of conveying their meaning may have been found.

The term “proprietary software” in the MAAT dictionary (2020) has an exact definition matching that of "source code." This duplication suggests a proofreading lapse, although this cannot be confirmed without consulting the publisher. The term "know your customer," which was adapted as إعرف عميلك */i’rif ‘amīlak/,* is probably a spelling inconsistency: the verb is written with a hamzah qath’, rather than with a hamzah washl (اعرف */i’rif/)* as given in the online dictionary Mu‘jam Al-Lughah Al-‘Arabiyyah Al-Mu’āshirah.

The solution for such cases is to exclude these data points from the theoretical classification and treat them separately through error analysis. Moreover, data can be removed if the erroneous data is minimal and does not affect the research results. Besides that, clearer data restrictions are needed; for example, the data being studied consists of English nouns or phrases that have been borrowed into Arabic. Thus, if data is found that has not undergone any changes whatsoever after being borrowed—whether in terms of sound, form, or meaning, as in the example above—then that data is eliminated.

### 4.8 Abnormal Data

During data collection, one entry was identified as anomalous: the term “PHP,” which was borrowed into Arabic as “PHP لغة البرمجة */lughah al-barmajah/*." This term is considered anomalous because, upon borrowing, an Arabic term was added without removing the original English term, and it is still written exactly as the English term. The Arabic gloss was probably added as supplementary clarification because no exact equivalent was adopted for "PHP." As with the previous cases, this entry is best excluded because it falls outside English-to-Arabic borrowing.

If forced into the framework, the unique data would fall under sound changes ("Satoshi" and "Satoshi Nakamoto), form changes ("RFID reader," "demographic data," "cave automatic virtual environment," "Internet of Medical Things," "wearable technology," "disruptive technology," and "interactive video"), and as semantic changes ("know your customer" and "PHP"). Such data are findings in themselves: they can feed into theory reconstruction or be analyzed separately.

Based on the arguments presented, the author is more inclined to develop these theories rather than accept or reject them entirely. This is because the language and terminology of information and communication technology are highly likely to continue evolving. Language evolves, is alive, and grows (Andriani, 2010, p. 14). Therefore, existing theories also need to be developed.

### 4.9 Theoretical Contribution and Implications

Taken together, the 700 entries reveal three patterns. First, MAAT (2020) relies overwhelmingly on semantic substitution: loanshifts account for 594 entries (84.86%), against 64 loanblends (9.14%) and only 28 loanwords (4.00%). Arabization in this dictionary is thus mainly a matter of reusing native lexical resources for new concepts rather than importing foreign sounds, which is compatible with the moderate position described by Khalid (2019) and with the metaphorical-extension and loan-translation strategies that Al-Athwary and Ali (2024) report for IT terminology. Second, loanblends are almost entirely compounds (59 of 64 entries), and the examples above show Arabic head-first order, with the head translated and the modifier transliterated, so structural adaptation follows Arabic syntax even when a lexeme is borrowed. Third, 22 of the 28 loanwords show partial phonemic substitution, and half of these (11 items) involve fortition, which may reflect adaptation to the Arabic consonant inventory rather than faithful reproduction of English sounds.

These patterns also clarify what the study adds to Haugen’s (1950) framework. The 52 *wazn* adjustments (7.43%) cannot be placed in Haugen’s semantic subcategories because the criterion is the derivational mechanism, not the semantic relation: a native pattern such as تفعيل /taf’īlun/ supplies a morphological meaning that helps carry the borrowed concept. A *wazn*-adjustment subcategory under loanshifts, therefore, extends the taxonomy to root-and-pattern morphology. This is consistent with Pakaya, Saleh, and Doni (2023), who report that *ta‘rīb* relies on *qiyās* and *wazn*, complemented by modern affixation, to form new words. Likewise, the data on -ic show that suffix adaptation depends on phrase-level agreement (*na’t–man’ūt*), which a word-based classification of loanblends does not capture, and “RFID reader” shows that the agentive -er may be rendered by a *wazn* rather than by yā' nisbah. Finally, the 14 unclassified entries (2.00%) indicate that the taxonomy presupposes a single donor language and a clean contrast between imported and

substituted material; multi-step borrowing (Japanese-form names entering Arabic through English) and mixed-script entries such as "PHP" fall outside this framework.

Three cautions apply. Classification involves judgment, especially in borderline cases such as “nonce,” where the vowel changes within the back-vowel class, and in the distinction between loan synonyms and loan homonyms, which depends on how closely old and new meanings are judged to share a semantic field. Remarks on possible oversight in MAAT (2020) are inferences from the entries themselves, not statements about the publisher’s procedures. Within these limits, the findings have practical implications. For terminology work, the *wazn* mappings and the head-first compound pattern can serve as explicit, reusable conventions that address the inconsistency motivating this study and the lack of coordination noted by Al-Athwary and Ali (2024). For technical translation, they offer a principled choice between transliteration and pattern-based coinage. For Arabic language planning, they suggest that dictionaries such as MAAT (2020) would benefit from publishing their Arabization criteria alongside the entries.

## 6. CONCLUSION

This study classified 700 ICT terms in MAAT (2020) using Haugen’s (1950) taxonomy and supporting theories. Sound changes appear as loanwords without phonemic substitution (6 entries) and with partial phonemic substitution (22); form changes as blended derivatives (5) and blended compounds (59); and semantic changes as loan homonyms (180), loan synonyms (362), and *wazn* adjustments (52). Fourteen entries could not be accommodated: two excluded terms, seven that diverge from suffix rules, four that are unadapted or possibly erroneous, and one anomalous entry. The main finding is that MAAT (2020) relies predominantly on semantic substitution (84.86%) and that Haugen’s framework needs extension for *wazn* adjustment and for suffix adaptation governed by agreement. The study contributes an Arabic-sensitive subcategory within loanshifts and a documented set of data that fit no existing category.

These conclusions have limits. The data come from a single dictionary, so the proportions may not hold for general dictionaries or other institutions’ terminology. Classification of borderline items rests on the author’s judgment, and no independent coder or native-speaker validation was used; future research should test classification reliability with several coders and native speakers. The dominant theories were developed for English or general linguistics rather than Arabic; future research should integrate Arabic linguistic theory with modern general theories in a balanced way. The analysis is synchronic and presents samples rather than item-by-item analysis of all entries; diachronic studies could trace terms that entered Arabic through English from other languages. Comparing MAAT (2020) with other specialized and general dictionaries would show whether the patterns found here are specific to this dictionary.

**Acknowledgments**
Not applicable.

**Availability of Data and Materials**
All data generated and/or analyzed during the current study are available from the corresponding author upon reasonable request. The dictionary analyzed is available at https://bit.ly/4kqqWX3.

**Competing Interests**
The authors declare that they have no competing interests.

**Funding**
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. The study was entirely self-funded by the authors.

**Authors' Contributions**
Istiliani conceived the main conceptual ideas, designed the research framework, collected the data, performed the initial analysis, and wrote the original draft of the manuscript. Luthfi provided comprehensive supervision and guidance from inception to completion, contributed to conceptual development, validated the methodology and data-coding procedures, evaluated the analysis results, and conducted the critical review, language editing, and final proofreading of the manuscript. All authors reviewed, provided feedback on, and approved the final version of the manuscript for publication.

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