

## ARRANGEMENT OF ISAN FOLK MELODIES FOR SOLO SAXOPHONE

Phongphat Laokhonka\*

Faculty of Humanities and Social Sciences, Loei Rajabhat University, Loei, Thailand

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### Abstract

**Background and Objectives:** This qualitative research aimed to create innovative arrangements of Isan folk melodies for solo saxophone while preserving the traditional essence in contemporary performance settings. The study also sought to analyze harmonization techniques that integrate traditional and modern musical frameworks, ensuring both coexistence and complementarity.

**Methods:** Four prominent Isan folk melodies—*Mae Hang Klom Look*, *Saxophone Lam Plearn*, *Maeng Tab Tao*, and *Sri Khotraboorn*—were selected based on their popularity, cultural significance, and adaptability. The arrangement incorporated both traditional Isan and Western instruments, using Western music theory to analyze harmonic, melodic, and rhythmic elements. Data collection involved structured interviews with music scholars and practitioners, participatory observations during rehearsals, and an extensive review of existing literature on Isan music and Western harmonization techniques. The research method followed three key processes: (1) Song Selection and Analysis, selecting and analyzing four iconic melodies and identifying structural and stylistic characteristics; (2) Arrangement and Harmonization, restructuring melodies for solo saxophone to maintain authenticity while adapting to contemporary performance; and (3) Validation and Refinement, obtaining expert evaluations to enhance quality and authenticity.

**Results:** 1) *Mae Hang Klom Look* was arranged in G minor, with the khaen and soprano saxophone as lead instruments. Western harmonic elements (D7, F, Bb) were integrated while maintaining its melancholic essence through ornamentation to enhance expressiveness and rhythmic modifications to remain traditional roots within contemporary. 2) *Saxophone Lam Plearn* incorporated jazz performance techniques such as improvisation and counterpoint while mixing traditional instruments with Western brass and woodwinds to demonstrate the adaptability of *Molam* in modern contexts. 3) *Maeng Tab Tao* employed quartal harmonies, syncopated rhythms, improvisation, and ornamentation with a combo band (guitar, piano, drums) creating a festive atmosphere. 4) *Sri Khotraboorn* used pop-jazz harmonic principles, with the interaction between the phin and soprano saxophone blending traditional and contemporary elements using chords F#sus9 and Cm.

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\* Corresponding author, email: dew.phongpat@gmail.com

**Conclusions:** The results of the research indicate that these innovative arrangements can serve as a model for harmonizing traditional music with contemporary practices, making Isan folk music more accessible to wider audiences. Furthermore, this study highlights the role of creative academic music in fostering cultural appreciation and ensuring the sustainability of traditional art forms in a globalized world.

**Keywords:** Isan Folk Music / Harmonization / Saxophone / Contemporary Music / Music Preservation / Musical Integration

## Introduction

Music must always place sound at its heart. Creating music that is truly alive should focus on sound, even if the work is academic or belongs to an academic field. Academic music that fails to connect with the actual sound becomes dry and lacks artistic value. In producing academic work in the field of music, if the process only involves data collection, compilation, and analysis, but fails to connect to musical notation or actual sound, the work is considered to have fallen short of the most crucial aspect of music.<sup>1</sup> Thai music and Western music are different in many aspects according to their origins in opposite parts of the world. These cultural and social differences result in unique developments in the instruments and styles of each musical tradition. However, when Western musical techniques are appropriately applied to Thai music, the result is harmonious blend that maintains the intricate characteristics and delicate tastes of Thai culture.

Isan folk music reflects the thoughts, beliefs, and contents of both knowledge and entertainment.<sup>2</sup> It possesses a specifically distinct identity to the Isan region, including its tonal patterns, language, melodies, and rhythms most significant form of Isan musical culture is vocal performance, known as Lam, which is often accompanied by the khaen (a traditional reed instrument), harmonizing perfectly with the vocal melody, a performance style commonly known as Molam.<sup>3</sup> Molam has been evolved to blend the vocal lines of Lam Plearn with Luk Thung (Thai country music), merging folk and Western musical elements. Various forms of Lam, such as Lam Plearn, Lam Toey, Lam Khon Kaen, and Lam Phan, were integrated with Luk Thung melodies, and solo performances of prominent Western instruments like the saxophone, organ, and guitar were combined with traditional Isan instruments.

It is evident that the saxophone, a woodwind instrument, plays a crucial role in Molam performances alongside the khaen. The saxophone's unique and versatile sound, capable of evoking a range of emotions from sadness to excitement, adds vibrancy to the Molam performance, making it indispensable for every

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<sup>1</sup> Natchar Pancharoen et al., eds., *Musical Literature: A Collection of Academic Creative Music Articles* (Bangkok: Tana Press, 2016), 24. (in Thai)

<sup>2</sup> Charoenchai Chonpairoj, *Music and Folk Performances in Isan* (Mahasarakham: Srinakharinwirot University, 1983), 26-27. (in Thai)

<sup>3</sup> Charoenchai Chonpairoj, *Research Report on Phuthai Music* (Mahasarakham: Srinakharinwirot University, 1986), 46-48. (in Thai)

Molam ensemble. Skilled saxophonists are in demand to join these ensembles, providing a source of employment and income leading to increased interest in learning the saxophone as a profession for aspiring musicians in the Molam scene.<sup>4</sup>

Consequently, the researcher was inspired to develop an interest in re-arranging Isan folk melodies to create a new, academically creative musical work. The goal was to demonstrate the fusion of Isan folk music with Western music through a developmental process grounded in the art of harmonization by using Western harmonization principles. Popular Isan folk songs, commonly performed by contemporary Isan folk music ensembles, were rearranged for solo saxophone to showcase the development of Western music while preserving the cultural heritage of Isan folk music. This re-arranged music can also be utilized to further the teaching and learning of musical disciplines, including music arrangement and performance. The objectives of this research are to harmonize Isan folk melodies for solo saxophone and to analyze and develop knowledge on harmonization techniques for this genre.

## Research Methodology

### 1. Participants

This study focused on developing Isan folk melodies by harmonizing them for solo saxophone. Participants were selected through purposive sampling, consisting of 15 individuals, including university lecturers, students, professional musicians, and freelance musicians, as follows:

1.1 Seven lecturers and students from Loei Rajabhat University.

1.2 Eight professional musicians, including military band members, secondary school music teachers, and freelance musicians from Loei Province.

### 2. Research Instruments

2.1 Structured Interviews for interviewing music scholars, folk musicians, and arrangers to select suitable Isan folk melodies for harmonization for solo saxophone.

2.2 Observation Forms for participatory observation during ensemble rehearsals to study the rehearsal process and performance of the musicians involved in the arrangement.

2.3 Song Evaluation Forms used by the experts to evaluate the quality and appropriateness of the harmonized pieces, aiming to refine the harmonization of Isan folk melodies for solo saxophone.

### 3. Data Collection

3.1 Preliminary research on Isan folk melodies was conducted through literature reviews, musical scores, and consultations with experts in folk music and musical arrangement.

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<sup>4</sup> Kritsana Thipakson and Tanaporn Phengsri, "Learning and Transmission Process of Saxophone Accompaniment for Morlam Performance by Samran Buphawatt," *Humanities and Social Sciences Journal, Ubon Ratchathani Rajabhat University* 9, no. 1 (January-June 2018): 285-295. (in Thai)

3.2 Suitable melodies were selected through interviews with musicians and experts, and these melodies were then harmonized for solo saxophone.

3.3 The harmonization process consisted of:

Step 1: Selecting songs and instruments.

Step 2: Arranging and recording the music.

Step 3: Verifying the accuracy of the musical notation.

3.4 Refining the arranged pieces based on expert feedback before being recorded and disseminated.

#### **4. Data Analysis**

The harmonized pieces were analyzed using Western music theory, focusing on the concepts and processes involved in the harmonization. The findings were presented through descriptive analysis.

#### **5. Data Validation**

Triangulation was used to validate the data by comparing information gathered from observations and interviews to ensure consistency with theoretical concepts on harmonization in Isan folk music.

### **Results**

The research entitled “Harmonization of Isan Folk Melodies for Solo Saxophone” aimed to create and develop harmonic arrangements of Isan folk melodies, tailored for solo saxophone performance. Due to the different characteristics between two cultures, it is challenging to transfer techniques from traditional Thai instruments to the saxophone; therefore, musical elements such as melody, rhythm, instrumentation, and harmonisation were analyzed and explained based on arrangement process primarily on Western music theory as the main framework. Additionally, the research focused on systematically explaining the concepts and processes involved in the arrangement. The Arranging was presented in align with the unique characteristics of Isan folk melodies.

When comparing the original melodies alongside their re-arranged versions to highlight the changes made during the Arranging process, they can be smoothly mixed together and produce new melody with hints of Isan melodies presenting through sound of Isan instruments such as phin and khaen. However, the new melody becomes contemporary enhanced by saxophone.

The results of the harmonization of the melody were explained for each of the selected songs and divided into topics: the structure of the songs, performance styles, and harmonic placement, following the principles of Western music analysis were examined as outlined below.

##### **1. Mae Hang Klom Look**

In the arrangement of Mae Hang Klom Look, the original melody was adjusted to fit the G minor scale. The main melody was divided into four sections: A, B, C, and D, with a tempo of 60 bpm, which is slower than the traditional version. The time signature used was 4/4, and the piece was arranged for a combo

band consisting of soprano saxophone, piano, electric bass, guitar, and drums. Additionally, traditional Isan instruments such as the khaen and phin were incorporated to add depth to the arrangement.

### 1.1 Song Structure

The song structure included an introduction, improvisation, and outro, as outlined in Table 1.

Table 1 Structure of Mae Hang Klom Look

Source: by author

Section	Description
Intro	Khaen plays the main melody, piano provides a counter melody (Bars 1-9).
A	Soprano saxophone leads the main melody, piano and guitar play the counter melody (Bars 10-18).
B	Same structure as section A with soprano saxophone leading (Bars 19-29).
C	Repeats the same structure with the soprano saxophone leading (Bars 19-29).
Improvisation	Khaen provides a background while electric guitar performs improvisation (Bars 39-47).
D	Soprano saxophone leads the main melody, similar accompaniment as previous sections (Bars 48-58).
Outro	Khaen leads the main melody with piano providing the counter melody (Bars 59-64).

### 1.2 Harmonization and Melody Development

The harmonic arrangement emphasized the use of basic chords to align with the structure of traditional Isan folk songs. Grace notes were added to enhance the melody, with the soprano saxophone leading the main melody supported by piano, using fundamental G minor scale chords such as D7, E $\flat$ , F, Gm, and B $\flat$ . Improvisation was based on the G harmonic minor scale, and the khaen provided a background melody using trill techniques. The melodic development allowed the song to conclude effectively, with the khaen extending the melody to create a traditional Isan ending.



Example 1 Grace Note in Mae Hang Klom Look

Source: by author



Example 2 Imitation of the Khaen Trill Technique in Mae Hang Klom Look

Source: by author

## 2. Saxophone Lam Plearn

This research also focused on the creation and harmonic arrangement of Saxophone Lam Plearn, a fusion of traditional Molam folk music with saxophone performance. The arrangement was designed for a combo band, integrating both Western and traditional Isan instruments. The piece retained the original melody while adjusting the structure and adding performance techniques to create a harmonious blend with unique characteristics. The alto saxophone was the primary instrument for the melody.

### 2.1 Song Structure

The structure of Saxophone Lam Plearn consisted of an introduction, main melody, solo, and outro, using the G minor scale at a tempo of 100 bpm. Techniques such as counterpoint were employed, and woodwinds, including flute, tenor saxophone, baritone saxophone, trumpet, and trombone, were incorporated along with piano and bass. This is outlined in Table 2.

Table 2 Structure of Saxophone Lam Plearn

Source: by author

Section	Description
Intro	Flute plays the main melody, with woodwinds and brass providing counterpoint (Bars 1-12).
A	Alto saxophone leads the main melody, supported by woodwinds and brass (Bars 13-28).
B	Alto saxophone continues the main melody with harmonic support from woodwinds and brass (Bars 29-45).
C	Alto saxophone leads with similar accompaniment as before (Bars 46-89).
Outro	Alto saxophone plays the main melody with support from the rest of the ensemble (Bars 90-104).

### 2.2 Harmonization and Performance Techniques

The harmonic arrangement used basic triads, reflecting the simple yet characteristic structure of Molam music. Counterpoint techniques mimicking traditional brass and woodwind arrangements were employed. Ornamentation, such as trills and grace notes, was used to enhance the performance of the saxophone and flute, particularly in the introduction and solo sections.



### Example 3 Trill in Saxophone Lam Plearn and Grace Note and Note Slurring Techniques in Saxophone Lam Plearn

Source: by author

### 3. Maeng Tab Tao

The song Maeng Tab Tao is a lively, humorous folk song often played at festive events. For this arrangement, the melody was adapted to the key of C minor and divided into three sections: A, B, and C. Jazz theory was applied to expand the melody for a combo band, consisting of guitar, piano, bass, drums, saxophones, and brass instruments, such as trumpets and trombones.

### 3.1 Song Structure

The structure included an introduction, main melody (A, B, C sections), improvisation, and a coda, as outlined in Table 3.

Table 3 Structure of Maeng Tab Tao

Source: by author

Section	Description
Intro	Piano plays the main melody with bass and drums accompanying (Bars 1-24).
A	Saxophones and brass lead the main melody, with guitar providing background accompaniment (Bars 25-36).
B	Brass and saxophones play the main melody with harmonic support from the rhythm section (Bars 37-44).
C	Saxophones, brass, and piano play the main melody, while guitar and bass accompany (Bars 45-52).
Improvisation	Guitar improvises with trombones providing background harmony (Bars 53-112).
Coda	Piano plays the main melody, guitar plays the counter melody (Bars 113-120).

### 3.2 Analysis of Harmonization and Techniques

Quartal harmony was used to create depth in the arrangement, with brass and saxophones alternating between the main melody and background harmonization. Improvisation used notes from the C minor scale, with chords such as Cm7, A $\flat$ maj11, and B $\flat$ maj11 to complement the main melody.

The musical score for Example 4 illustrates the harmonic arrangement of Maeng Tab Tao. It features a multi-staff arrangement with the following components:

- Staff 1 (Saxophones):** Alto 1, Tenor 1, Bar. sax. Includes a "Diatonic approach" and a "Saxophone soli melody" marked *ff*.
- Staff 2 (Brass):** Tpt. 1, 2, 3, 4; Tbn. 1, 2, 3; Bass Tbn. Includes "Brass section background" and "Spread voicing".
- Staff 3 (Guitar):** J. Gtr. Shows a "Quartal Chord" progression: Cm7, Ebmaj7, G7, Cm7, Abmaj7, Bbmaj7.
- Staff 4 (Piano):** Pno. Accompanies the guitar with similar chord progressions.
- Staff 5 (Bass):** Bass. Provides a harmonic foundation with the same chord sequence.
- Staff 6 (Drums):** Dr. Features a rhythmic pattern with dynamics *mf* and *f*.

Chord progressions shown: Cm7, Ebmaj7, G7, Cm7, Abmaj7, Bbmaj7, Gm7.

Example 4 Chord Progressions for the Harmonic Arrangement of Maeng Tab Tao

Source: by author

## 4. Sri Khotraboorn

In the arrangement of Sri Khotraboorn, the traditional melody was adapted to the key of G minor, divided into four main sections: A, B, C, and D, and pop-jazz theory was used to enhance the melody, with a fusion of Western and traditional instruments.

### 4.1 Song Structure

The combo arrangement included various instruments such as guitar, piano, bass, drums, soprano saxophone, and the traditional phin, which maintained the original folk identity of the song. The soprano saxophone alternated with the phin as the lead instrument.



Table 4 Structure of Sri Khotraboorn

Source: by author

Section	Description
Intro	Phin plays the main melody, soprano saxophone and keyboard provide background (Bars 1-18).
A	Soprano saxophone leads the main melody, phin and keyboard provide background accompaniment (Bars 19-27).
B	Similar to section A with additional harmonic depth (Bars 28-33).
C	Piano leads the main melody with support from phin and guitar (Bars 34-42).
D	Soprano saxophone leads the main melody with support from the rhythm section (Bars 43-60).

4.2 Performance and Harmonization Analysis

In the introduction, the phin played the main melody, with soprano saxophone and piano providing harmonic support. Syncopation in the rhythm section created interest in the melody. Chords from the B♭ major scale were used to harmonize with the main melody. The harmonic arrangement used complex chords such as Fsus9, Gm, Cm, and E♭ to create smooth transitions in sections A and B.

The musical score for the introduction of Sri Khotraboorn is presented in a multi-staff format. The instruments included are Soprano Saxophone, Strings, Phin, Guitar, Piano, Bass Guitar, and Drum Set. The tempo is marked as 90. The key signature consists of two flats (B♭ major). The Phin plays the main melody, while the other instruments provide harmonic support. The guitar and piano parts include chord diagrams for Dm, Cm, Dm, Cm, B♭, Cm, E♭, Dm, E♭, D, and D.

Example 5 Introduction (Bars 1-8) of Sri Khotraboorn

Source: by author

The results demonstrated that this arrangement effectively fused traditional and contemporary musical elements, preserving the unique identity of Isan folk music while incorporating pop-jazz influences.

## Discussion

The study on harmonizing Isan folk melodies for solo saxophone performance aimed to create and develop harmonic arrangements that fit well with the instrument. The researcher arranged the compositions by primarily utilizing Western music theory to analyze and explain the musical elements, including melody, rhythm, instrumentation, and harmonization. Additionally, the study emphasized systematically explaining the concepts and processes, presenting the arrangements in a way that aligns with the distinctive features of Isan folk melodies. The researcher explored the song structures, performance styles, and harmonization based on Western music analysis, as follows:

The study of the arrangement and application of Isan folk melodies in a modern context, through the songs Mae Hang Klom Look, Saxophone Lam Plearn, Maeng Tab Tao, and Sri Khotraboorn, demonstrates the potential of folk music to adapt and connect with Western music effectively. The fusion of traditional melodies with modern arrangements helps preserve the cultural and musical identity of folk music and enhances its appeal and acceptance across a broader audience which is consistent with Pusit Suwanmanee's<sup>5</sup> research on the development of Thai folk songs for wind orchestras, which aimed to study the understanding of folk songs from Thailand's four regions and explore the approach of selecting songs to be harmonized for wind orchestras, creating innovative works to promote Thai folk music more widely.

The inclusion of Western instruments such as saxophone, electric guitar, and piano alongside traditional Isan instruments like khaen, phin, and phueng reflect a creative form of cross-cultural communication could bring folk music to life and accessible to contemporary audiences. This is consistent with Akarawat Chaumklang's<sup>6</sup> research on harmonizing Isan folk songs in classical music for chamber ensembles. His creative research highlighted the need to study ethnomusicology in selecting songs that retain Isan's local identity while applying Western harmonic techniques, including melody, chords, scales, and rhythmic patterns.

The arrangement of Mae Hang Klom Look emphasized the use of a sorrowful melody, performed with prominent instruments like soprano saxophone and khaen. This creative fusion of Isan folk music and Western music theory is consistent with Surasit Sreesamuth's<sup>7</sup> who studied on arranging Thai songs for wind orchestras and found that adapting music for wind orchestras involved changes in instrumentation and melody techniques.

Saxophone Lam Plearn demonstrated the application of Molam melodies with jazz performance techniques, expanding the scope of Molam music for the modern era. This echoes Natchar Panchareon's<sup>8</sup> research, which explored the application of Western music techniques in Thai compositions, focusing on

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<sup>5</sup> Pusit Suwanmanee, "The Adaptation of Thai Folk Songs for Wind Band" (Master's thesis, Silpakorn University, 2014), 48-51. (in Thai)

<sup>6</sup> Akarawat Chaumklang, "Arrangement Isan Folk Songs in Classical Music Form for Chamber Ensemble," *Chophayom Journal* 30, no. 1 (January-May 2019): 227-240. (in Thai)

<sup>7</sup> Surasit Sreesamuth, "A Study Arranging of Thai Traditional Music for Wind Band" (PhD diss., Mahidol University, 2013), 157-167. (in Thai)

<sup>8</sup> Natchar Panchareon et al., eds., *Musical Literature: A Collection of Academic Creative Music Articles* (Bangkok: Tana Press, 2016), 3. (in Thai)

harmony, melody creation, and rhythmic arrangement for the piano, showcasing how Western techniques can be beautifully applied in harmonizing Thai music.

The arrangement of Maeng Tab Tao used combo-style instruments and enhanced the melody with jazz techniques to enhance the song lively feeling while connecting to various social and cultural contexts. Sri Khotraboorn suggested the use of the phin and soprano saxophone to create a link with Isan folk music, while incorporating complex jazz-pop chords, making the song more contemporary and accessible. In addition,<sup>9</sup> conducted the study on applying jazz harmony theory to arrange Thai songs for wind instruments in a big band setting and found that jazz harmony could be successfully applied to Thai songs while maintaining the original structure and adapting arrangements to the musicians' skills and performance objectives.

## Conclusion

This study on harmonizing Isan folk melodies for solo saxophone has demonstrated the effectiveness of blending traditional Isan music with Western music theory and performance techniques. By arranging and developing songs like Mae Hang Klong Look, Saxophone Lam Plearn, Maeng Tab Tao, and Sri Khotraboorn, the research has successfully preserved the cultural identity of Isan folk music while adapting it for modern contexts. The fusion of traditional Isan melodies with contemporary arrangements not only enriches the music's appeal but also ensures its accessibility and relevance in a globalized world.

The research highlighted the importance of using Western harmonic structures, including melody, rhythm, and instrumentation, to create arrangements that resonate with both traditional and modern audiences. By incorporating instruments like the soprano saxophone and electric guitar alongside traditional Isan instruments such as the khaen and phin, the study demonstrated how cross-cultural communication can enhance the vibrancy of folk music. This innovative approach ensures that Isan folk music continues to evolve while remaining deeply rooted in its cultural heritage.

In conclusion, the research underscores the value of applying contemporary music theory to folk traditions as a means of both preserving and expanding their reach. The arrangements created through this study serve as a model for how folk music can thrive in modern performance settings, offering a path forward for the ongoing development and recognition of Isan music on a global stage.

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<sup>9</sup> Raweewat Thaicharoen, Ratchakrit Panuakkarachok, and Pakawan Boondirek, "How to Apply Theory of Big Band Jazz Composition Adapts to Use in Thai Popular Music: Case Study Music in Concert Psalm the Princess," *Rangsit Music Journal* 13, no. 2 (July-December 2018): 73-88. (in Thai)

## Bibliography

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- Busayakul, Wirat. "Moonmang Isan Music." In Arts and Culture Exhibition Moonmang Isan, Sakon Nakhon Teacher's College, January 14-16, 1983, 79-96. (in Thai)
- Chaumklang, Akarawat. "Arrangement Isan Folk Songs in Classical Music Form for Chamber Ensemble." *Chophayom Journal* 30, no. 1 (January-May 2019): 227-240. (in Thai)
- Chonpairoj, Charoenchai. *Music and Folk Performances in Isan*. Mahasarakham: Srinakharinwirot University, 1983. (in Thai)
- Chonpairoj, Charoenchai. *Research Report on Phuthai Music*. Mahasarakham: Srinakharinwirot University, 1986. (in Thai)
- Kaensombat, Chinda. "Luk Thung - Molam: Northeastern Folk Songs Spreading into Capital Society." *Journal of The Way Human Society* 4, no. 1 (January-June 2016): 153-173. (in Thai)
- Kerdpol, Tanapat. "An Analysis of the Musical Arrangement of Song of Honor: Symphonic Band by Wijit Jitrangsan." Master's thesis, Srinakharinwirot University, 2013. (in Thai)
- Pancharoen, Natchar et al., eds. *Musical Literature: A Collection of Academic Creative Music Articles*. Bangkok: Tana Press, 2016. (in Thai)
- Sreesamuth, Surasit. "A Study Arranging of Thai Traditional Music for Wind Band." PhD diss., Mahidol University, 2013. (in Thai)
- Suwanmanee, Pusit. "The Adaptation of Thai Folk Songs for Wind Band." Master's thesis, Silpakorn University, 2014. (in Thai)
- Thaicharoen, Raweewat, Ratchakrit Panuakkarachok, and Pakawan Boondirek. "How to Apply Theory of Big Band Jazz Composition Adapts to Use in Thai Popular Music: Case Study Music in Concert Psalm the Princess." *Rangsit Music Journal* 13, no. 2 (July-December 2018): 73-88. (in Thai)
- Thipakson, Kritsana, and Tanaporn Phengsri. "Learning and Transmission Process of Saxophone Accompaniment for Morlam Performance by Samran Buphawat." *Humanities and Social Sciences Journal, Ubon Ratchathani Rajabhat University* 9, no. 1 (January-June 2018): 285-295. (in Thai)